Technical Study 64e,f

Sharing Knowledge for Development

IDRC's Information Strategy for Africa

CANADA

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Abstract / Résumé / Resumen

Abstract — Financial and human resources available in Africa and among donor agencies such as the International Development Research Centre (IDRC) are limited and can be used most effectively within an explicit strategy. Such a framework of objectives and programs must be consistent with sub-Saharan Africa's own priorities and existing infrastructures for research and information. With input from African specialists, the Information Sciences Division of IDRC has developed a strategy for support to information systems, networks, and services. The strategy is aimed at benefiting as many people as possible, and increasing support to the high priority activities and needs that have been identified.

The major objectives of the strategy for Africa are fivefold: first, to encourage sharing of information — locally, nationally, and regionally — and to promote standards and compatibility among national and regional information systems; second, to improve the capacity among African nationals for planning and implementing information and informatics policies and increase the use of local experts in information handling; third, to promote participation by poor people by supporting information systems that address local problems, and improve access of local development researchers, decision-makers, and practitioners to relevant information; fourth, to build human resources in information sciences — specifically to impart skills in managing information systems, in acting as agents of change, and in soliciting and sharing knowledge produced in sub-Saharan Africa; and, fifth, to ensure that information initiatives are sustainable.

Résumé — Les ressources humaines et financières dont disposent l'Afrique et les organismes donateurs, notamment le Centre de recherches pour le développement international (CRDI), sont restreintes et il importe d'avoir une stratégie explicite pour les utiliser le plus efficacement possible. Le cadre de travail doit comporter des objectifs et des programmes et il doit respecter les priorités de l'Afrique subsaharienne et de ses infrastructures actuelles en matière de recherche et d'information. Avec l'aide de spécialistes africains, la Division des sciences de l'information du CRDI a élaboré une stratégie de soutien aux systèmes, réseaux et services d'information, afin d'en faire bénéficier le plus grand nombre et d'accroître l'appui apporté aux activités et besoins reconnus comme étant les plus pressants.

La stratégie relative à l'Afrique poursuit cinq grands objectifs : premièrement, encourager le partage de l'information — à l'échelle locale, nationale et régionale — et promouvoir l'établissement de normes et la compatibilité entre les systèmes nationaux et régionaux d'information; deuxièmement, accroître la capacité des Africains de planifier et de mettre en oeuvre des politiques en matière d'information et d'informatique, et faire davantage appel aux spécialistes locaux du traitement de l'information; troisièmement, encourager la participation des plus démunis en appuyant des systèmes d'information de soutien axés sur les problèmes locaux et permettre un meilleur accès à l'information pertinente de la part des chercheurs, des décideurs et des praticiens oeuvrant au développement local; quatrièmement, former des ressources humaines dans le domaine des sciences de l'information — en particulier préparer des personnes à gérer des systèmes d'information, à être des agents de changement, et à recueillir et faire connaître les

connaissances de l'Afrique subsaharienne; et, cinquièmement, assurer la viabilité des initiatives en matière d'information.

Resumen — Los recursos financieros y humanos existentes en Africa, así como aquellos que se encuentran en manos de agencias donantes tales como el Centro Internacional de Investigaciones para el Desarrollo (CIID), son limitados, y la mejor manera de utilizarlos eficientemente es empleando una estrategia claramente definida. Una estructura de objetivos y programas como ésta debe ser consistente con las propias prioridades e infraestructuras existentes en el Africa subsahariana para la investigación e información. Contando con la cooperación de especialistas africanos, la División de Ciencias de la Información del CIID ha desarrollado una estrategia de apoyo a sistemas, redes y servicios de información. La estrategia se propone beneficiar al mayor número de personas posible e incrementar el apoyo a las actividades y necesidades de gran prioridad.

La estrategia para Africa tiene cinco objetivos principales: primero, estimular el intercambio de información en los planos local, nacional y regional, además de procurar que los sistemas de información nacionales y regionales se rijan por normas establecidas y haya compatibilidad entre ellos; segundo, mejorar la capacidad de los africanos para planificar y poner en práctica políticas en los dominios de la información y la informática e incrementar el uso de expertos locales en el procesamiento de la información; tercero, estimular la participación de los pobres, coadyuvando en el establecimiento de sistemas de información de apoyo concebidos para tratar problemas locales, y hacer que los investigadores locales sobre el desarrollo, ejecutivos y médicos tengan un mejor acceso a la información pertinente; cuarto, capacitar a individuos para que puedan trabajar en el campo de las ciencias de la información — específicamente, impartir conocimientos acerca de cómo utilizar sistemas de información, la forma en que aquellos que reciban el adiestramiento puedan actuar como agentes del cambio, y acerca de cómo solicitar y compartir conocimientos originados en el Africa subsahariana; y quinto, asegurar que las iniciativas sobre información mantengan un ritmo sostenido.

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Foreword

Recently, the Organization of African Unity (OAU) drafted a new and comprehensive developmental plan for the continent. This plan, promulgated in July 1985 and entitled the African Priority Program for Economic Recovery (APPER), is a blueprint, stressing, among other things, the role of information, especially in conjunction with economic and resource management and science and technology. The International Development Research Centre (IDRC) would like to contribute to Africa's recovery. A look at the current conditions indicates there is much to be done.

Among donors, IDRC is young — not yet 20 years old — and it is unique in having a division that is devoted to the support of information projects. However, requests for support have tended to reflect the interests and priorities of the established information community. This has worked against IDRC objectives to fund activities that benefit particularly disadvantaged groups.

This publication is based on discussions and written contributions by African specialists. It draws on:

- Two workshops (one in Dakar, 24–26 March 1987, for francophone Africa and one in Nairobi, 29–31 March 1987, for anglophone Africa) that were attended by administrators, researchers, and information specialists. Each workshop involved commissioned papers followed by discussions. (An accompanying volume (IDRC 1988) contains versions of the papers presented at the meetings; see Appendix C for titles of individual papers.)
- A mail survey of about 240 national and international agencies and individuals responsible in the development and information fields — 40 were sent from Dakar to central and West Africa, 100 from Nairobi to eastern and southern Africa, and 100 from Ottawa to other regions. About 40% of the letters elicited comments.
- Contributions by IDRC's team for management of information programs and projects in Africa and the field representatives, who met for 3 days in Nairobi immediately after the second workshop.

The aim was to identify sub-Saharan Africa's information needs and priorities by digesting, distilling, and synthesizing the wealth of material and to prepare a detailed list of information-related problems and some proposals to remedy the problems. This list later formed the basis for the present report. Hence, aside from the sections entitled "IDRC's response," this report represents the Information Sciences Division's interpretation of the contributions made by African and other

specialists, whether at the workshops themselves or through the survey conducted by mail.

The framework is new, and it represents the first time IDRC's Information Sciences Division has elaborated an integrated regional plan. It is also particularly appropriate for Africa because of the urgency for development in the region. It is hoped that this strategic statement will also reaffirm IDRC's objective to support projects that directly benefit the general population and that allow for sustainable growth, equity, and participation.

Martha B. Stone
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International Development Research Centre

Introduction

The Developmental Setting

If the development community has learned nothing else in the past 20 years from its efforts to transplant technologies from the industrial world into Africa, it has at least come to realize that development is complex and long term — an evolutionary rather than revolutionary process.

The current crisis in Africa is a product of recent history and is not a result of inadequate resources. The continent is rich in diversity: after Asia, it is the largest continent, with an area of 30.4 million km^2. According to the Food and Agriculture Organization of the United Nations (FAO), Africa encompasses 836 million ha of potentially arable land, although only 170 million were under cultivation in 1985. The surface area currently irrigated is estimated at 9 million ha but the potential has been put at 45 million.

A large part of the world's mineral reserves are in Africa, including 96% of all diamonds, 90% of chromium, 85% of platinum, 50% of cobalt, 55% of manganese, 50% of the phosphates, 50% of gold, 40% of bauxite, 13% of copper, and large known reserves of nickel, lead, and iron.

At present, 10 African countries are petroleum producers, and it is likely that many of the others have deposits of natural gas, although little is currently known about the size or the accessibility of reserves. Africa possesses about 25% of the world potential for hydroelectricity, and only a small amount has been exploited.

So why is Africa at the centre of an economic and environmental crisis in the 1980s? Fundamental and structural problems are facing the countries and have led to a situation in which food production, per person, is declining; the level of well-being of the population is deteriorating; and the environment is rapidly being eroded by population and climatic pressures.

Historical perspective

From a historical point of view, the major structural problems can be traced to the partitioning of Africa into a multitude of small states; the continent has been divided into 51 nation states with 460 million inhabitants (excluding South Africa) (Fig. 1). The potential natural wealth is unevenly distributed, and the territorial limits have contributed to the economic, commercial, scientific, and technological

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Fig. 1. The states of Africa.

constraints. For example, in 1983, there were 36 African states with fewer than 10 million inhabitants and 12 had fewer than 1 million inhabitants. Clearly, many of the nations are not viable as economic units.

At the time of achieving political independence, the states inherited dual economies. On the one hand, they had a rudimentary market dominated by the colonial states and geared toward the exploitation and exportation of natural resources. On the other, there was a subsistence system of agricultural production largely controlled by individual farmers or nomadic peoples raising livestock. More than 80% of the people were part of the subsistence economy, with production systems:

- Being largely independent of state structures;
- Producing a minimal surplus;
- Being operated by peasants concerned with diversifying their operations to minimize risk; and
- Incorporating little technological change because they existed outside the formal market economy and had limited access to it.

The new governments were obliged to redirect the economic and social structure toward meeting the needs of their populations. To achieve this, they adopted politicoeconomic models ranging from capitalist to socialist and Marxist ideologies.

Essentially, the governments wanted to provide support for improvements in all sectors — health, education, agriculture, transport, communications, industry, etc. — to bring the living conditions of their populations more in line with those of the rest of the world. At the local level, the subsistence setup meant virtually no indigenous capital for investment; thus, most states attempted to plan centrally and to intervene in all sectors.

To finance the programs, they continued to export their natural resources and increasingly taxed the surplus from the rural sector to maintain low food prices for the urban sector. They began also to rely heavily on foreign investment in the form of foreign aid.

Industries were created to produce the goods required for development programs, and, in most instances, governments constituted the primary source of investment. Although, traditionally, industrialization has taken place in countries where surplus labour has been liberated from the rural sector as a result of technological innovation, in many African countries, there was no surplus skilled or semi-skilled labour from the rural sector. Furthermore, the purchasing power in the local market was not sufficient to support the output from industry. The result has been unproductive industries, working at less than full capacity, with prices of goods being set in an artificially protected market.

Such problems produce political instability, which is exacerbated by the relative newness of the administrations. Although all the countries are clearly geopolitical entities, some are not yet strong nations. Several do not have a cohesive identity, and the political divisions as well as civil strife hamper development. In some of the countries, fighting has become a way of life.

The result is that sub-Saharan Africa has 5 million refugees, more than any other continent. Absorbing these refugees into other states poses serious adjustment problems and places excessive strain on the recipient country's economy and social services (Ngaiza and Lewis 1986: 15).

Most countries receiving immigrants are having difficulty feeding their own populations. For the region, food production increased annually an average 1.5% during 1970–84. Population increased an average 2.7% per year. In other words, on a per-person basis, the food supply decreased by 1.2% per year during the period. From 1970 to 1980, the volume of food imports increased by 8.4%, with 20% of sub-Saharan Africa now depending on food imports, 25% of which are provided by food aid (Irumba 1986: 5–6).

Major environmental constraints have to be overcome before food production can be markedly increased, and a concerted effort must be directed to reducing post-harvest losses, conserving the output, and transforming food so that its shelf-life can be extended.

In 1985, the population was estimated at 460 million and, at present fertility rates, is expected to reach 1.1 billion by the year 2015 — in fewer than 30 years (World Bank 1984: 5). The age distribution within the population presents another

developmental problem: 45% of the population is currently younger than 15 years, giving a high dependency ratio (World Bank 1984: 28). This ratio is the sum of people younger than 14 years and older than 65 divided by the number of people between ages 15 and 64 — the age group regarded as productive. In sub-Saharan Africa, the ratio is 92.5; in Europe, it is 50.2 (Irumba 1986: 49).

Although experts hope fertility rates will decline in response to economic development, decisions must be taken immediately to ensure that living conditions are improved so that the demographic transition occurs. Otherwise, the ever-increasing population will grow poorer and less able to provide food, health care, education, and employment for itself.

Of the total population, 20–25% lives in urban centres where population growth is 5–7% annually (World Bank 1983: 32–33). The migration of people from rural areas to the cities stresses urban social services and disrupts traditional family and social relationships. It also deprives the rural areas of young, productive (and, at times, educated) people.

Governments have had to deal with two separate sets of policy issues — urban and rural — and to set priorities between them. Governments in Africa, as those elsewhere throughout recent history, have directed much of their attention to the urban setting at the expense of rural development (Ngaiza and Lewis 1986). The result has been poor agricultural productivity and uneven income distribution in favour of the cities.

One obvious reason that governments have traditionally invested in urban development is the relative ease with which a large number of people can be provided with services — for example, schooling. Often, therefore, schools are found mainly in cities, although African countries have made enormous progress in providing primary education.

According to the United Nations Educational, Scientific and Cultural Organisation (Unesco 1986: 7), school enrolment in primary education rose from 43.5 to 84.3% between 1960 and 1985. However, the rapid expansion has taken its toll in quality: funds allocated to education have stagnated, many teachers have had no formal training, planning in education is poor, and equipment is seldom available. At both the primary and the secondary levels, what is taught is often not appropriate to economic needs, and skills are lacking in many fields. Also, 54% of men and 65% of women are still illiterate, and, although the percentages of illiterate adults have declined since 1970, the numbers have risen (from 139 million in 1970 to 162 million in 1985) (Unesco 1986: 7).

Health, like education, is an area in which governments have made great progress since independence. In the last 30 years, life expectancy has increased from 35 to 50 years. Infant mortality has decreased from 175 per thousand live births in 1960 to 107 in 1984. As with education, however, the figures still do not compare well with those elsewhere. Estimates in 1985 indicated that immunization levels among African children were the lowest in the world: polio, 32%; measles, 35%; tuberculosis, 41%; and diphtheria, pertussis, and tetanus, 33% (World Bank 1986: 28). Malnutrition and disease continue to be widespread, and the forecast is not good as viral diseases against which there is no vaccine — such as AIDS (acquired immune deficiency syndrome) and hepatitis — continue to spread in the region.

Meanwhile, the environment is deteriorating, and weather patterns are exacerbating the effects of forest clearing by people in search of fuel, building materials, and prime agricultural land.

The Sahelian zone, which occupies a band stretching across the middle of the continent, with conditions similar to those in southern Africa, is particularly vulnerable to deforestation. It is characterized by variable rainfall (between 200 and 800 mm annually) and fragile soils that are being forced to support increasing populations of people and livestock. Overgrazing, brush fires, and drought contribute to the loss of ground cover, and the desert grows.

Current estimates are that 60% of deforestation in the world takes place in Africa: forests and the savanna woodlands have been halved since the turn of the century as wooded areas have been cleared, not only for local peoples but for export of exotic species. The process is eroding the agricultural base of most African countries and, thus, undermining their major source of income. (In 1982, agriculture accounted for 41% of the GDP — gross domestic product — and employed about 70% of the population.)

Most of the water for agriculture is provided by rainfall, which is extremely variable in many parts of sub-Saharan Africa. For the past 20 years, levels of rainfall have been lower than usual. With a population that is expected to double in the next 30 years, water will become a scarce commodity. Groundwater is available and its exploitation is likely to become economically feasible.

These are some of the developmental realities. To deal with them, governments require systematic plans, applied research, and a network of people gathering, analyzing, repackaging, and sharing information. The challenges for the research community are to investigate, adapt, revise, and apply what is known in an effort to explore the unknown.

Research environment

Although one can point to interesting examples where research done in the Third World has had a profound impact on developed countries as well as developing countries, by far the largest part of 20th centuryscientific activity has taken place in the industrialized countries. Unesco (1985) has estimated that developing countries accounted for 2.3% of research and development in 1970, and, despite increases in the resources allocated since, the research efforts are still inadequate.

According to statistics on science and technology published in 1985 by Unesco, the number of African scientists and engineers engaged in research and development in 1980 amounted to only 0.4% of the worldwide total; that for developing countries as a group was 10.6%. Translated into a figure per million inhabitants, the value for Africa is 86, compared with 121 for all developing countries and 2875 for the developed countries.

During 1980, the funds allocated to research and development by African countries represented 0.33% of the worldwide total against 5% for all the developing countries. Total resources allocated to research and development in Africa, expressed as a percentage of gross national product (GNP), were 0.36 in 1980, compared with 0.43 for all developing nations and 2.24 for the developed countries.

Unesco admits that no exhaustive study has been undertaken to verify these figures in Africa, but the statistics indicate the magnitude of the gap between what is being done on the second largest continent and what is under way elsewhere.

Modern scientific methods, like the nation states themselves, are just becoming established in Africa. Yet, African governments are aware of the potential advances from science and technology, and most have set up ministries to oversee policy and planning. In 1974, under the auspices of Unesco, the first conference of ministers responsible for application of science and technology in Africa (CASTAFRICA) was held in Dakar, Senegal, and a second one was held recently in Arusha, Tanzania. In 1980, the OAU produced the *Lagos Plan of Action for the Economic Development of Africa, 1980–2000*; the plan cited some member states as having adopted measures to develop an adequate scientific and technological base and to apply science and technology to the development of the economy (OAU 1982).

Even stronger political commitment is needed if the small, energetic groups of researchers are to put their knowledge to work to solve the urgent problems facing the continent.

The numbers of researchers are few, and no country has a defined plan to develop qualified personnel — personnel who receive training appropriate to the social and economic problems of the continent.

For West Africa, with a few exceptions such as Ghana, Nigeria, Senegal, and Sierra Leone, countries did not establish their own universities until independence. In the Sahel, five countries have established universities only within the last 5 years, and three countries still have no university.

The main role of universities has been teaching rather than research, and the orientation in university education is often remote from the region's developmental problems. In anglophone Africa, the orientation is toward applied and social sciences, whereas universities in francophone Africa have emphasized the pure sciences and humanities. Some francophone universities do not even have a school of agriculture, and most agricultural researchers in these countries have been trained abroad. "Écoles supérieures" do train agronomists but place little emphasis on giving them the skills to conduct research.

Research that is undertaken in the universities is generally an individual effort and has little or no impact on development decisions. Even where there is a will to deal with development problems, all too often the means cannot be found to give researchers access to rural communities or other groups needing assistance.

Although one finds the highest concentration of scientific personnel in universities, the quantity and the quality of research are impeded by:

- The overall orientation of the university toward teaching rather than research;
- The lack of emphasis on scientific research because of the shortage of financial resources and services; and
- The lack of impact of the results of research on decision-making and development.

At the national level, more than 90% of the research is publicly funded and is done by individuals working in universities, government departments, and national

institutes. The remainder is undertaken by a few nongovernmental organizations (NGOs) and private foundations. The structures suffer from a lack of human, financial, and material resources. Agencies set up to coordinate science and technology are also expected to do research and promotion.

Most countries have nationalized the institutes that were set up by the colonialists, and Africanization has been rapid. Only a few institutes still operate entirely with expatriate scientists, although expatriate staff sometimes work in national institutes as part of bilateral and multilateral aid projects. Central African Republic is one country that has a very limited infrastructure for research and relies almost completely on the French Ministry of cooperation.

Africanization of the international and regional organizations doing research on the continent is increasing, and those established by African member states have moved more rapidly in this direction than those that depend on international financing. The contrast in the financial resources available to institutes funded by member states and those funded internationally is striking and emphasizes the obvious — believing in the value of scientific innovation is not enough to offset the shortage of funds available to the nations.

Foreign aid for research in agriculture has been growing rapidly, but few resources are spent on research into health, environmental, industrial, or social problems. International and regional organizations that undertake research in the region include the international agricultural research centres, such as the International Institute of Tropical Agriculture (IITA) and the International Livestock Centre for Africa (ILCA); and the institutes of the Economic Commission for Africa (ECA), such as Centre régional africain de technologie (CRAT, African regional centre for technology), of the OAU (Semi-Arid Food Grains Research and Development Project), of the Economic Community for West Africa (ECOWAS) such as the Centre régional d'énergie solaire (CRES, Regional centre for solar energy), and of the Southern African Development Coordination Conference (SADCC).

Disseminating and applying the results

The momentum for research is building as are expectations. The risk is that scientists will lose credibility if the information they generate is not applied or is not applicable to real conditions.

Politicians cannot justify increased budgets for research that does not have concrete results. Research, like development, is a political issue, and scientists have a role to play in ensuring the political will for continued research: they must build links with the economic sectors of the country and involve decision-makers. Currently, the key economic sector is agriculture so scientists must explore techniques of communicating with farmers and designing their research to replicate the constraints faced by local producers.

This concept is not new; researchers have been wrestling with the issues for some years. More and more farming-systems research is being undertaken, and most research institutes and countries have experimented with methods of

transforming and disseminating technical information in a usable form. Much more work is required, especially now that the body of knowledge about local staples has become substantial.

Practically all the work on such major food crops as sorghum, millet, legumes, cassava, and yams has been done within the last 20 years. During the colonial period, the research was directed mainly toward improvement of cash crops — rubber, coffee, cocoa, and tea. Any advances with subsistence crops were incidental. Similarly, the training given to Africans was directed toward excellence in basic rather than applied research.

The shift toward a multidisciplinary approach to deal with specific developmental problems or production constraints has been fairly recent. However, it has meant that some researchers have begun to work with the populations they are expected to serve. The trend is commendable and should be supported by the curriculum within their university studies.

Equally, scientists and researchers must have access to information about what their colleagues within and outside Africa are doing. In the absence of computerized searches of scientific data bases, Africans spend months undertaking literature reviews that are done in a matter of hours by their colleagues in developed countries. Rapid access to results of other people's efforts is essential to optimize the scientists' time. International scientific journals are difficult to obtain in Africa where foreign exchange is at a premium. Universities, even in developed countries where the journals are published, complain about the high costs. Publication is expensive, and prestigious journals all over the world have folded in the last decade.

The stream of scientific information that flows into and across Africa is drying up, and the African research community is at risk of becoming isolated from the mainstream of world scientific thought.

Even massive infusions of financial resources cannot solve these problems quickly, but progress is being made and depends on continued allocations. In a modest way, IDRC hopes to contribute toward some of the solutions, by enabling African researchers to investigate the issues they have identified as priorities.

IDRC as a Donor

In any study such as this, we must remind ourselves of what IDRC stands for, what its objectives are, and how it works to achieve these objectives. IDRC is a corporation created by the Parliament of Canada in 1970 to stimulate and support scientific and technical research by developing countries for their own benefit. As organizations go, it is young; but within a period of 16 years, it has grown considerably and achieved a status and results that are a source of much satisfaction. Much, however, remains to be done.

Because of the constraints of a budget, to which all organizations are subject, IDRC operates in a limited number of research fields. These fields are reflected in the way in which the organization is structured: five main divisions — Agriculture, Food and Nutrition Sciences; Social Sciences; Health Sciences; Information Sciences; and Communications — and two supporting divisions — Fellowships and Awards, and Cooperative Programs (since changed to the Earth and Engineering Sciences Division). These two divisions support activities that can cut across the other fields or, under specific conditions, link research institutions in developing countries with those in Canada.

The fields of investigations to which IDRC gives its financial and professional support affect — directly or indirectly — the day-to-day lives of people in the developing world. The objective of IDRC is not only to produce research results whose applications will improve the condition of people in these countries, however. A major objective is to enhance the capacity of developing country institutions and individuals to produce such research results. By helping to build up such capacity, IDRC ensures that the developing countries' research institutions increase their ability to recognize, define, and solve their own problems and to help apply the results.

IDRC tries to approach these twin objectives with humility, sensitivity, and a strategy of responsiveness. However extensive the experience and wisdom of any group of persons may be, they cannot presume to know all that is needed to recognize and define day-to-day problems in all parts of the world, especially the less developed world. It is even more difficult to agree on the types of solutions that are likely to be acceptable in solving these problems.

Furthermore, again bearing in mind that we have to work to a budget, we cannot in a logical and consistent way be responsive to too wide a range of requests. IDRC, therefore, must set boundaries to the problems that it can respond to: there is

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an implied contradiction in declaring a policy of responsiveness and at the same time stating that certain problems are out of bounds, yet with a finite organization with finite resources, this must be the case.

The question is how do we best define the boundaries to ensure that we shall be responding adequately to requests for support in tackling, through research and research support, those problems that affect "directly or indirectly, the day-to-day lives of people in the developing countries." It was in the search for answers to this question that the participants gathered at the two workshops.

In addition to furthering the development of information science as a discipline with strong roots in the research institutions of the regions that constitute the developing world, IDRC must ensure that it is responding to the real development needs of those regions. These needs are dictated by the socioeconomic environment, which, therefore, demands our close attention. What are the income and expenditure patterns? What are the major commodities? What are their production and marketing problems? What are the other sources of income and the problems associated with them? On the expenditure side, energy is a major factor in development. In a region in which there is practically no oil, what are the implications of large expenditures on oil? Is the development of other sources of energy, especially new and renewable sources, feasible? We have to examine expenditures on social services such as education and health in relation to gross population growth, patterns of population growth, cost effectiveness, and equity. Again in relation to these factors, national and regional infrastructural costs such as those of transport, housing, and telecommunications must be closely monitored and reviewed. Above all, the current major constraint of debt servicing needs to be tackled in a way that will ease the burden significantly without creating other economic and social problems.

National and regional trends in all these factors must be documented and monitored to facilitate policy decisions at several levels. Even those decisions and their effects must be monitored to provide feedback.

Behind each of these factors and trends are problems of population growth, migration, urbanization, urban and rural employment, environmental degradation (through natural and artificial causes), health, and human resource development. All these need study and in-depth research to provide the bases for action.

Sudden crises, such as drought and AIDS, demand quick as well as long-term responses. What do we know about the nature of the drought in a country such as Ethiopia? What can be done now? What actions must be taken over the long term? Similar questions can be raised about AIDS.

Much research of a development nature is needed over a whole range of disciplines with focus on particular problems or a related set of problems. Many decisions of a technical or policy nature need to be taken. For all these, the provision of relevant information at the appropriate time is critical. IDRC cannot, therefore, underestimate the importance of the information sciences, given its commitment to research for development as well as research and development.

Support provided by IDRC in the field of information sciences is expected to help developing countries to:

- Establish regional and national information systems and improve library infrastructures at these levels;

- Participate in international information networks;
- Create specialized information centres (serving the region or the world) on development-related subjects, especially in agriculture, health, population, industry, the environment, cartography, and socioeconomic issues; and
- Develop information tools and methods.

IDRC's mode of operation does not involve provision of technical aid personnel. The Centre depends on the developing countries to allocate researchers and technical staff. Where there are critical shortages of personnel, it can help to secure training. This policy has meant that support has been concentrated in countries with established research institutions and technical personnel. However, by requiring that the projects be applicable to other countries in the region, IDRC hopes also to improve the prospects for countries that are particularly disadvantaged.

Strategy for Assistance

Information Sciences Working Group on Africa
Shahid Akhtar, Peter Boyle, Kieran Broadbent, Garth Graham, Paul McConnell, Gilbert Ndiaye, Antoine Terjanian, and Robert Valantin, IDRC, Ottawa.

Introduction

This chapter presents the strategy for support to information systems and services in sub-Saharan African countries that was developed through workshops with African specialists, a survey of interested parties in Africa and internationally, and the experience of the staff of the Information Sciences Division.

These activities were aimed at elaborating an integrated regional plan for responding to the real information needs and priorities of sub-Saharan African countries, as perceived by and in the region. It was very much a learning experience for the Division, and the first time an explicit integrated regional strategy has been developed, based on intensive discussions and surveys of all potentially interested parties: African administrators, researchers, and information professionals; potential recipients; national donor organizations; and IDRC's staff from Ottawa and the Regional Offices in Africa — Cairo, Dakar, and Nairobi.

The identification of needs and priorities, and the strategy for response presented here were both distilled from the wealth of material generated by all the participants in the process. A detailed listing of information-related problems has been made, together with proposals for some solutions to the problems.

The strategy emphasizes the need for solutions to address national and regional priorities in ways appropriate to existing conditions. The local, national, and regional information infrastructure to support research and development needs to be strengthened, so that consistent improvements and appropriate linkages between information systems and services can be planned.

Until the 1980s, the Division's approach to development assistance was to maintain a complement of staff who traveled from the Centre's headquarters to assess requests for aid and to assist researchers in presenting applications for funds. The focus of assessment was the inherent value of the projects; the geographic and sectoral distribution of projects was not a major consideration. In the early 1980s, IDRC strengthened its regional offices throughout the world so that it could reach more recipients. Since then, the Information Sciences Division has maintained staff in Asia, South America, and Africa. This decentralization has provided the Division with a better view of what is going on in the developing world and has opened permanent communications channels between the regions and IDRC's headquarters.

What has become clear is that these approaches to project funding would benefit from more coordination, that the Division needs an integrated approach or strategy to guide its responsiveness to development information: that it needs a conceptual framework to strengthen project and program linkages. The development of a "Strategy for sub-Saharan African countries" is a major contribution to this framework.

Objectives

Distilling and interpreting the contributions from Africans and others who participated in workshops and surveys to produce a strategy for sub-Saharan Africa, the Information Sciences Division drew up a list of objectives that it feels should pervade all its support for information activities in Africa:

- To improve the effective utilization and sharing of existing knowledge and resources in Africa at the local, national, and regional levels;
- To design and implement information systems and services that are relevant to the local environment and that address specific needs and problems;
- To improve information sharing and data transfer at the national and regional levels by promoting standards, compatibility, and use of methodologies, technologies, and tools adapted to the African environment;
- To improve the indigenous capacity to plan, develop, and implement national and regional information policy;
- To secure long-term commitment for sustainable information programs;
- To stimulate greater use of local technical expertise in information handling by promoting South–South cooperation within Africa;
- To build human resources in information sciences through needs-based training at all levels and, particularly, training of managers and trainers to strengthen the multiplier effect;
- To improve the capacity of people involved in the provision of information to act as agents of change;
- To promote a two-way flow of communication so that rural (and urban) poor people participate in an interactive dialogue on issues affecting them; and
- To improve the capacity of local scientists and technologists to obtain relevant information and bring about a more effective transfer of technology at the grass-roots level.

These objectives can be further distilled into a collection of key phrases — better utilization of existing resources, more user-oriented services, better coordination, more attention to sustainability, special priority for systems benefiting the poor, increased participation and two-way flow of information, comprehensive training opportunities, and increased involvement with information systems to bring about change.

Relationship with IDRC policies

The objectives are very much in tune with IDRC's approved mandate and have much in common with statements adopted by the IDRC Board of Governors and published recently:

> IDRC's mission is to contribute to development change through research and research-supporting activities. The Centre aims to assist in promoting the indigenously determined social and economic advancement of the developing regions of the world, with particular focus on the problems of poverty [IDRC 1985: 31].

> The Centre's objective is to support research of direct relevance to and demonstrable potential for Third World development, with relative emphasis on poverty problems; and, in pursuit of that end, to assist developing countries to build and maintain indigenous research and research-supporting capacity, mainly at the national, but also at the regional level, and mainly in terms of human resources [IDRC 1985: 31–32].

> The Centre must endeavour constantly to ensure that the activities it supports reflect three essential elements of development as viewed from the perspective of the beneficiaries: sustainable growth, equity, participation [in the decision-making which determines development] [IDRC 1986: 4–5].

For the sake of clarity, it is worthwhile to take a look at how the Africa-specific objectives relate to the broader objectives of the Information Sciences Division. What, if anything, is special about the proposed response to African needs?

The objectives of the Africa strategy do not require any radical departure from the areas of activity or the methods of the Division. They do require a more focused and coordinated program. The directions to be pursued by the Division in Africa must include:

- Development of human resources in the information field by providing education and training at all levels, from short seminars for upgrading of skills to postgraduate research;
- Improved use of existing knowledge, systems, services, and resources by means of several different techniques, including South–South cooperation, better interaction with users, adaptation of information tools and methods, increased use of some of the known information technologies, and strengthening of national information systems;
- Careful design of sustainable information systems tailored to serve the needs of specific groups and directed toward specific development issues; and
- Support for information systems and services designed to benefit poor populations more directly, including the active participation of these populations in a two-way flow of information affecting development decisions.

Users and beneficiaries

The last point brings into focus the users and beneficiaries of activities to be supported by the Division. Although an oversimplification, information users could be split into three target groups:

- Those needing information for research;
- Those needing information for policy and planning decisions; and
- Those needing information to implement developmental change at the local level — this group encompasses extension workers, community action groups, farmers, etc.

> To date, emphasis has been placed primarily on the needs of the research community, followed by the needs of policymakers. However, it is expected that increased attention will be paid in future to supporting those information activities designed to have a more direct impact on the ultimate beneficiaries of the Centre's work [IDRC 1986: 57].

The strategy still envisages the same range of target groups but promotes a shift in emphasis toward those needing information to implement developmental change. Under the new strategy, two components will be emphasized:

- Information tools, systems, and services designed to improve the flow of scientific, technical, and other information to be applied by the intended beneficiaries; and
- Activities that enable the people to participate in the flow of information leading to research and to decision-making that affect their own development.

Associated with these foci is the involvement of information workers acting as agents of change. Specific measures to accomplish these tasks will be determined through experimentation, but the objectives are consistent both with the needs stated by Africans and with the declared mission of IDRC.

An operational shift is implicit in the Africa strategy because meeting some of the needs expressed by Africans during the workshops will require surveying existing resources, identifying African consultants and troubleshooters, and organizing training sessions and similar activities — a more extensive role than in the past for the Division. The information community and others in Africa have made it clear that this is the role they would like the Division to play.

For an organization such as IDRC, which is essentially responsive, any strategy is an expression of direction and emphasis rather than a statement of clear-cut rules. In executing its program in Africa, the Division will seek to concentrate its support on activities that reinforce each other and, hence, progress in meeting Africa's information needs.

Given the objectives of its strategy, the Division expects that project proposals will contribute to developments in the following major spheres of action:

- Capturing and delivering information by and for Africans;
- Responding to users' needs and behaviours;
- Building national infrastructures;
- Sharing resources across the region;

- Upgrading skills of information personnel; or
- Funding and sustaining services and systems.

The rationale for these foci and some of the ways the Division expects to provide support deserve mention.

Background and Proposed Action

Capturing and delivering information by and for Africans

Setting up mechanisms to capture and share information produced within Africa is perhaps the most pressing of the problems to be tackled. The lack of such mechanisms affects virtually every segment of society. At present, African farmers, researchers, scientists, government workers, and extension personnel alike have few forums in which to share their knowledge.

African information practitioners are painfully aware that expensive expatriate consultants are often brought in because no one knows the competent consultants in the region. Priority must be given to improving the use and coordination of existing knowledge and resources in Africa. The advantages of using African personnel rather than consultants from developed countries include familiarity with local conditions, constraints, cultural factors, contacts, and language; proximity for follow-up; and (usually) lower fees, payable in local currency. There is considerable scope for encouraging South–South cooperation to mobilize the experiences and expertise available within the region, perhaps supported by local, regional, and sectoral registers and directories of researchers, research institutes, and consultants.

Drawing on consultants from the region is one desirable way of tapping local expertise, but there is also a need to capture and record local knowledge and to make it more readily available to a larger audience. Groups must be willing to provide effective, long-term support to the endeavour. Given the concern expressed by African practitioners about the loss of potential benefits because local knowledge is sometimes difficult to obtain, agencies need imaginative measures designed to tackle this problem.

Sometimes information has to be repackaged or consolidated before delivery to specific target audiences. For example, published results of scientific and technological research on agriculture, health, the environment, economics, etc. must be repackaged to be understood by administrators, policymakers, extension workers and other intermediaries, or farmers. Repackaging of written materials may be in audiovisual or other nonprint forms. Oral traditions are a strong link in the information chain in Africa, and they have potential for disseminating information on health, sanitation, and farming methods. The aim is to use all types of media in innovative and appropriate ways to reach the end users.

Consolidation denotes the merging and condensing of information, often from many sources; it involves selection, analysis, synthesis, transformation, and repackaging, followed by dissemination of the output to end users. For example, at

ILCA in Addis Ababa, information about animal husbandry is brought together, transformed, and repackaged as abstracts, bibliographies, monographs, manuals, newsletters, etc. for a range of different users.

For such outputs, the service requires a setting that in Africa is currently available in institutes such as IITA, ICRAF (International Council for Research in Agroforestry), ILRAD (International Laboratory for Research on Animal Diseases), and ICIPE (International Centre of Insect Physiology and Ecology). They could serve the demand regionally, producing information in the official languages of the nations and, where possible, work with other services to ensure appropriate packaging locally.

Repackaging requires special skills that may include science and journalism. Staff with such expertise, as well as the institutional support for such activities, are generally in short supply in Africa.

Likewise, the training and experience of most of the extension workers in Africa are inadequate for their tasks of information delivery at the community level. Many of them are poorly motivated because the incentives are meagre. They are in a prime position to interact effectively with both literate and illiterate farmers, but they are unlikely to do so unless they understand the value of what they are doing and the key role of farmers, particularly women, in the future of the country.

Extension workers could be offered training in community development to support their agricultural activities, and, at the least, they should be given guidance in developing information packages that farmers can use without having to learn complex new skills. Indices to evaluate the efficiency and impact of extension would be valuable, and one form of index is the numbers who adopt innovations — an index that is also a measure of the quality of innovations. The flow of information must be two way from research, through extension, to farmers and back again. It must travel along a route that includes global, regional, national, and specialized information analysis centres.

To inform extension workers, literate farmers, and others, publications are the most commonly used medium — largely, newsletters, circulars, and handouts. One instructional aid for extension workers is the audiotutorial. For example, teaching extension workers and their clientele how to use technologies developed or adapted by the Botswana Technology Centre (BTC) is the aim of audiovisual materials and radio programs produced by BTC. The key is to choose a medium to suit the message and the audience.

Choosing the appropriate methods demands a range of skills in preparing and presenting material. It means surveying needs and setting priorities, promoting and marketing the information services, and helping users learn how to find the information themselves.

Further experimentation is required with pilot village information services to search for innovative ways of using indigenous knowledge and for delivering information, integrating oral communications with print-based messages, and testing different organizational principles, practices, and objectives. At the village level, such services should collaborate closely with extension agencies, literacy programs, and rural development projects. Some characteristics of the users of these services will influence the demand and the design. Key among these are illiteracy, which means not only an inability to read but also a lack of the accompanying approach to prob-

lem solving; long hours of manual work, which affects the users' time and interest; conservatism, which stems from the high cost of mistakes in a subsistence economy; and a static, iron-age (hoe and machete) technology, particularly in agricultural activities.

Information services could aim at, for example, imparting literacy, detailing appropriate technology, assisting with formulating government policies, improving crop production and animal husbandry, preventing spread of diseases, reporting heritage and culture, spreading indigenous knowledge, or supporting exchange of information by the village with external agencies and other villages.

All people seek input and information from others when they make decisions, consulting channels that have worked for them in the past.

Indigenous information

One underutilized and vast source of information is the people living in subsistence or marginal economic circumstances. The people are the source of information about what is happening. Currently, 85% of the people in sub-Saharan Africa are involved in subsistence economies. One must ask whether the worldwide emphasis on economic development and the move toward a cash economy mean that these people are simply written off. An alternative may be to look inward for self-sustaining approaches, even though these are not growth-based. The record of achieving the objectives of economic development in sub-Saharan Africa over the last 20 years has been dismal, even retrogressive. Rethinking the long-term consequences of current objectives brings a different perspective to considerations about the value of indigenous knowledge.

In all the communities, the production systems that are in place work most of the time. External systems proposed (or imposed) to replace them usually do not work because they are not as comprehensive as what was already there.

Putting indigenous as well as outside knowledge within reach of the people would allow them to fit the information into their systems to address their particular problems. Attempts to tap indigenous knowledge are thwarted by fixed perceptions of development objectives; negative attitudes toward people in marginal or disadvantaged circumstances; and fragmentation of services. Another constraint derives from the fact that farmers and marginal peoples explain what they do in cultural terms that seldom correspond to the views of the western scientific world or to the standard methods for paradigm changes, as currently understood. Local community knowledge is too often disregarded by others, especially scientists and administrators, and its pragmatic basis in experience is overlooked. This knowledge and experience would effectively enhance any adaptation of new methods and systems.

The rural farmer knows that survival depends on his or her own decisions. The government is seen, at best, as well meaning. Planners and decision-makers often express negative or paternalistic attitudes toward rural dwellers. The concern to maintain political control as a first priority often goes so far as to interfere with the use of local languages as a vehicle for education and for dialogue on development issues. Discussions of rural development include such distancing phrases as "mobilization of the masses" or the need to "wait until literacy campaigns make it possible to involve people directly," or "the peasants must move from subsistence to wage earning before development begins." Giving a stronger voice to indigenous

knowledge would help to diminish the isolation between planners and the people being planned for.

One step taken recently to capture the indigenous knowledge of local farmers and to put new information within their grasp is farming-systems research. This involves the identification of domains with similar ecological conditions and production systems, in-depth analysis of the farming activities within those domains, introduction of field-level experiments, with gradual adjustments as an innovation moves from being researcher-controlled to being farmer-controlled. This approach makes research practical for the farming conditions and operations and brings to light constraints not apparent on research stations, for example, in the distribution of labour and resources. On-farm adaptive testing and final recommendations then become the product for extension activities.

Working closely with the producers and users during the design of information systems is the only way to find out what information they need and how it can be provided effectively. Only with direct input from potential users can systems be designed to deliver relevant and timely information. Similarly, the only way to keep systems relevant is to monitor them, with regular input from users. Clearly, the information worker must move from custodian to provider, and information services must emphasize outreach rather than storage. Through this approach, information workers not only can improve service to current users but can also expand the numbers of users and, hence, the chances for continued allocations of funds.

Some of the approaches that information intermediaries and extension workers can use to give a voice to indigenous knowledge are:

- View the rural and urban poor as generators of information as well as users, observe and record, and design services to make what is recorded locally accessible and exchangeable;
- Adopt the role of information broker regardless of where the information is or who has it — this involves setting up information systems that point to the person who has the information, not to books;
- Provide feedback to communication programs and services on their effectiveness;
- Work to integrate the efforts made by community information providers — partnerships involving information workers, field extension workers, adult literacy workers, and the community;
- Produce needed information only, carrying out dialogue with the members of a community to find out what they need and what their priorities are;
- Provide wider access to the results of community meetings;
- Assess the socioeconomic impact of changes, using and adapting standard techniques as well as developing new ones;
- Consider the appropriateness of the communications channels used; and
- Design programs to repackage and discuss the analyses of research projects so that the results can be communicated back to the local level where the data were collected — local people will then have greater capacity to express their difficulties and influence official responses.

Channels for information must run between people and data bases if the content of the data bases — whether scientific, socioeconomic, or statistical — is to be accurate, relevant, and used.

Information for management

Managers, administrators, and policymakers need good quality, appropriate input to make informed and rational decisions. In Africa, at the top levels of policy formulation and decision-making, it is often unclear just how decisions are taken. These personnel, at the apex of their institutional structures, should be the target for consolidated information collected and transmitted from lower levels. In practice, they may have little formal input of information, they may manage their ministries or departments by crisis and frequently shift policies. They appear unable to identify their information needs and are unaware of the value of information input.

The decision-makers consult people they view as knowledgeable intermediaries able to supply information, often of a nonformal type; they could benefit from input by professionally trained intermediaries able to translate economic, scientific, sociological, and other data into forms acceptable and usable at ministerial, permanent secretary, or similar levels. In short, decision-makers should have access to specialized information analysis, similar to what has been recommended for scientific communities. This entails increased concentration on sectoral information rather than on information on and about development.

Sectoral information services

Supporting sectoral information services — scientific, technological, and socioeconomic — is the direction that Africans at the workshops advocated and is the way that the Information Sciences Division of IDRC has been moving.

The rationale is that the focus of sectoral information is appropriate for researchers who are attempting to create a foundation for the sectors. By drawing from what is known locally and adding what has been discovered elsewhere in their discipline, researchers can develop and test hypotheses — the crux of information on science and technology, applied to natural and social sciences alike. In the information context, the first step is to find out whether local groups have had experience with the same or a similar problem. Because little local experience has been recorded, the value of such consultations is largely determined by how near (in time and characteristics) the earlier problem was to the current one. The next step is to find out whether current national or international activities have dealt with similar problems. Quite often, a problem can be solved by adapting and applying innovations developed and used elsewhere. Even when there are no practical applications, other approaches and technological innovations can assist researchers in addressing problems.

In Africa, because of the lack of information services and a scarcity of journals and books, many researchers operate with few information sources. The result is needlessly repeated (and costly) research, lack of awareness of relevant developments elsewhere, and isolation of the researchers. Another result is the loss of credibility for information services, libraries, and information centres, with a matching lack of communication between researchers and librarians — a vicious circle.

The solution involves action on a number of levels, starting with government support for better information resources, better trained information professionals, and redirection of libraries and information centres toward active rather than passive services. These activities depend on making the research community and government personnel aware that information is an essential requirement for research.

Research teams must be sure that they have the resources to carry out their tasks. They, and their governments and managements, will, therefore, benefit from information on research in progress, donor activities, and individuals and institutions engaged in research and development nationally. They also benefit from comparative data on their resources and efforts. Sharing such information depends on the priority that national governments give science, technology, and socioeconomic development as reflected in national scientific and socioeconomic objectives embodied in information policies. Without broad policy support, researchers have few prospects for successful programs, no matter how practical their investigations.

National policies are not enough to ensure success, however. They must be backed by practical, financial, and institutional support as well as sufficient commitment to allow time to execute and implement a program or project of research and development. Mechanisms to facilitate investigation and testing of relevant hypotheses and exploration of methods used by other research groups are equally important. These mechanisms include the provision of information services that enable researchers to examine critically their proposed methods, compare them with studies in the literature, and make use of the latest concepts and technologies applicable to their work.

Hitherto, African information systems, including those supported by IDRC, largely focused their attention on documentary information services. Today, practitioners realize that users' needs are rarely restricted to any single type of information. This is particularly true of managers, national planners, and policymakers as well as of development workers at the lower echelons who require statistical and numerical information to carry out their functions adequately. The shortcomings of prevailing statistical systems are numerous. Existing statistical systems are highly centralized. Information flow is unidirectional, with little or no feedback to local levels. Use of statistical data collected at the local level for problem-solving at the local level is unheard of. District- and community-level development workers have no access to the data on their constituencies. Published statistics are aggregated and are not useful for particular needs. Furthermore, as socioeconomic realities shift, governments have been confronted with the task of developing indicators that will help them monitor the changes. The building of statistical and other numeric information systems, therefore, has become a pressing priority, as has the development of tools and methods associated with them.

Few journals are published in Africa and most Africans must compete for space in Western academic journals to publish the results of their research. A few Western journals accept articles about problems in tropical environments but focus predominantly on issues affecting their own regional audiences or addressed by their own national authors. Thus, the results of research in Africa largely go unpublished or are reproduced for a small number of local individuals while western research on Africa may find a wider audience in developed countries.

At present, efforts may be recorded in several forms:

- Research reports to sponsors, with copies available to selected groups designated by the sponsor and researchers;
- Scientific papers in books or technical journals, which are usually produced for the benefit of peer information and review;
- Patents, which are usually the result of a technological innovation from research programs;
- Product guides, which include design manuals for the expected users or target groups; the content is for technology transfer rather than reporting of scientific research, and the style is adapted to the perceived target group;
- Popular features, which appear in the popular media — newspapers, television programs, and radio announcements;
- Annual reports of the sponsoring organization; and
- Seminars and workshops.

Documentation on research results should be collected by a national information service, catalogued in an easily accessible form, and made available to those who can benefit from it. The formats and outputs of such a service are dictated by the resources and coverage of products and services in each country. Such a service provides continuity in the investigations of problems and enables investigations that build on one another.

In Africa generally, scientific publication is at a low ebb for lack of resources, official support, skilled personnel, and efficient printing facilities. Journals of international repute are few. Emphasis in Africa is on applied and adaptive research, which offers the potential for an intermediate level publication.

An unknown but appreciable amount of research fails to be written up and its results are thus largely wasted. Other research is buried in annual reports, workshop reports, and other nonconventional media that are inadequately covered by secondary information services. The publication requirements of different linguistic regions simply go unrecognized, and the optimal mix of national and regional serials is not known.

High standards need to be promoted in African publications with official support and quality scientific editing, proofreading, graphics, and print for both journals and books. Researchers need means of developing skills in writing and editing, and cadres of editors and proofreaders who can maintain high standards must be developed. Better refereeing standards for scientific papers must also be established, with attention also being given to the task of persuading administrators, policymakers, and research directors to foster publication and dissemination of the products of research.

The relevance of local bibliographic information systems and access to international data bases for scientific and technological information is beyond dispute. For the former, the primary literature is often locally produced and available and is not protected by copyright. These materials could be reproduced if, as is seldom the case, the equipment (such as microfiche and photocopiers) and supplies were available.

In contrast, the primary literature for international data bases usually must be

obtained from foreign sources. If local libraries and documentation centres have not purchased the literature, then users must arrange to obtain copies from international clearinghouses, rendering payment in foreign currency, and usually having to wait for weeks or months.

What is clear is that the delivery of primary documents to users is difficult whether the materials are produced locally or internationally. The inability to deliver has a direct bearing on the relevance of the data bases and on the users' satisfaction. It also threatens the utility of modern technologies such as CD-ROM (compact-disk, read-only memory) and on-line links.

The decline in financial resources being made available for the purchase of books and periodicals and the rising prices for publications exacerbate the problems.

The solution lies partly in testing and provision of the requisite matériel and equipment for document delivery and partly in coordinated acquisition of foreign literature and increased outlays of foreign exchange to libraries and other information services.

The Division's Science and Technology Information group is well placed to respond to the concerns expressed about agriculture, health, sanitation, industrial technologies, climatology, and energy- and water-related issues. Services should focus on providing access to local, regional, and international scientific and technical information to support basic human needs, sustain food supplies, and grow staple crops, especially in dry and semi-arid areas; and on enabling countries such as Kenya and Zimbabwe to use their experience to help other African nations.

The Socioeconomic Information group responds to social, political, economic, and cultural development of national and local communities, and tends to be mission-oriented, multidisciplinary, and specific to individual societies, cultures, and communities. The scope is wide, and the boundaries between subjects are nebulous and ill-defined. Issues of economics, labour, trade, marketing, women in development, refugees, rural residents, urban dwellers, housing, health care, and education are all linked. Yet it is particularly important that the forms and foci of information services on these issues be tailored to specific audiences.

Information systems and services

Information workers, as well as their clientele (the producers and consumers of information), require information to carry out their work. Some tools of the trade provide access to information sources that help them cater to their clients; these include directories, union catalogues, and inventories of data bases.

The tools, methods, and technologies used by the information profession directly influence the effectiveness with which information workers do their jobs. Unfortunately, for Africa, no appropriate, well-organized information on them exists.

Tools include card catalogues, optical coincidence systems, thesauri, and software to access computerized data bases. Methods and systems approaches include village-level information centres, integrated district-level systems, decentralized and centralized networks, information repackaging and consolidation, and agricultural extension. Technologies include manual methods, computers, micrographics,

telecommunications systems, and remote sensing. The gap in what is available is especially wide for information about modern technologies.

Information workers require information on the state of the art in information handling; on technologies adapted for use in particular circumstances or working conditions; case studies of both successful and unsuccessful information systems and approaches; local availability, cost, and experience with techniques; local policies and regulatory conditions (especially on telecommunications); and local sources of expertise. Without such information, they cannot make informed choices about tools and techniques. Likewise, they cannot effectively share experience and expertise, nor can they readily develop realistic user-oriented applications.

The selection of tools and technologies, especially at the design stage of an information system or service, usually has a major impact on the funding, outputs, personnel, infrastructure, connections with other systems, and, hence, the effectiveness of the activity. However, choosing appropriate tools or technologies is often difficult, and depends on local infrastructure, available information, experience with and availability of adapted and documented alternatives, local expertise, and standards.

An "appropriate" tool or technology is one suited to the training and skills of the personnel who will use it today and tomorrow and to the clientele for whom it will be used. It is one adapted also to such items as the institutional environment, local infrastructure, physical requirements, local support and maintenance, financial resources, functional requirements, volume and type of information to be handled, regulatory constraints, current practices of related information services, and standards, and to changing conditions.

This is the ideal, and, at times in Africa, modern electronics-based technologies — microcomputers, telecommunications, micrographics, optical storage systems, and remote sensing — fit the bill. For example, remote sensing satellites and digital image analysis systems have proved valuable for African countries attempting to identify and manage their resources.

The "high-tech" field abounds with jargon, great promise, and sometimes great disappointments. The feeling among African information professionals is that such technologies are inevitable and useful in many domains. Yet, there is also confusion, fear, and misinformation, emphasizing not only the need for programs in human resources development but also the value of presenting the pros and cons to policymakers, offering general computer literacy programs as part of the public education system, and researching the impacts of the technologies.

The "high-tech" methods can be combined with other technologies and applied in innovative ways to reach out to meet the needs of the ultimate beneficiary of research in a village. Intermediate and traditional methods include telex, radio, print and nonprint media, information repackaging, agricultural extension, or village-level services.

Adapting tools and technologies to make them more appropriate to users or applications is a continual process and, to the extent that it involves major changes, novel approaches, innovative uses of techniques, or development of new tools, it is applied research.

IDRC's response

The most effective means for the Information Sciences Division of IDRC to contribute is to strengthen national and local systems to enable them to comply with the priorities of users through the collection, organization, repackaging, and dissemination of information generated locally. Also, the Division should contribute to the establishment of links with other local, national, regional, and international systems.

One starting point is to gather and disseminate information already available. Where possible, it will support:

- Surveys and inventories within sectors and among user groups, particularly those assessing what is and what is not working within Africa;
- Two-way, reciprocal exchanges of information up and down the levels of local, national, and regional information systems rather than unidirectional, hierarchical flows;
- Studies of information users and uses, with special attention to government and public-sector establishments, educators, legislators, and the mass media;
- Surveys and strengthening of existing centres, institutions, and services (on a long-term basis), one aim being to facilitate coordination and networking;
- Indigenous publication programs;
- Studies of the presentation and marketing of information for specific users and interpretations, particularly for change agents, extension workers, and intermediaries;
- Nonbibliographic information services, following, for example, the philosophy of DEVSIS level II (Development Sciences Information System), especially statistical systems at local levels, and their use in developing socioeconomic indicators from the local level upward;
- Information on different methods of handling information and on local experience with different tools, methods, and technologies;
- Assessments of priorities in information delivery nationally to deal with real and persisting developmental problems (as exemplified by debt, imbalances in trade, and unemployment) as well as national emergencies (such as refugees, desertification, and famine) and major national, political, social, economic, and security goals;
- Development of information systems that cater to local governments to enable the institutional, infrastructural, and legal framework to be built up to handle information for and by indigenous groups;
- Clarification of the scope of socioeconomic information for use in development planning and development indicators;
- Surveys on the organization, management, coordination, and use of existing information systems and services;
- Case studies of successful information activities;

- Preparation of inventories, union catalogues, lists of data bases, and directories of consultants;
- Imaginative approaches to improving document delivery; and
- Increased use of African languages, such as Arabic and Swahili, in information handling.

Projects to be supported by the Division must be able to demonstrate close interaction between the information workers and their clients, and effective promotion of services to different categories of users.

A distinction can be made between rural information systems that serve the needs of rural people directly and rural development information systems that operate for planners to anticipate rural needs. The information intermediary (extension worker) who can communicate between these two systems is in short supply.

The Division will respond to projects that give emphasis to the emergence of information in and to projects that increase the accessibility and utilization of indigenous knowledge at both levels.

Finding ways of increasing the accessibility and utilization of local knowledge would directly address five of the objectives in the Division's Africa strategy:

- Improving the effective utilization and sharing of existing knowledge;
- Designing and implementing information systems that are relevant to the local environment and that address specific needs and problems;
- Improving the capacity of providers of information to act as agents of change;
- Allowing for greater participation of rural and urban poor in dialogue on development issues by encouraging a two-way flow of information; and
- Improving the capacity of local scientists and technologists to obtain relevant information and bring about a more effective transfer of technology at the grass-roots level.

The Information Sciences Division recognizes the difficulties that African researchers face in trying to publish their results. It acknowledges that much scientific, technical, and socioeconomic documentation appears solely in annual reports of organizations or in mimeographed reports filed in research or government institutions.

New publications, despite apparent interest, have come and gone as financial failures. Consequently, although this topic has been identified as one of the most important by participants in the Africa strategy workshops, and emphasis will be placed on this objective in the Division's program, progress will depend to some extent on tasks being initiated by IDRC, combined with innovative project proposals.

The Division will help in the delivery of information by supporting efforts to establish centres for repackaging extension information in local languages and non-print media for use in assisting farmers.

At present, farmers in Africa still obtain most of their information from each other; the numbers of extension workers are few when compared with the numbers of farmers, and the support services for extension workers are seriously lacking. All

governments must focus on improving this basic component of their national infrastructures. This is only one of the priorities they must face in the diverse task of building national infrastructures.

Responding to users' needs and behaviours

Most information projects and programs in Africa, including those supported by IDRC, have been based on the assumptions that information is needed across and in all development sectors and that their products and services will be readily used. Because of these assumptions, information scientists have had little concern, if any, for surveying users' needs, discerning users' preferences, or stimulating demand. In other words, insufficient attention was given to use of services during the design of information systems.

Today, African practitioners emphatically point out that the African users are ill understood, that there is a big difference between potential and actual users, and that the products and services are highly underutilized.

The users that the information sources have been created to serve do not frequent formal channels of information, the products of the information systems are not attractive enough or are inappropriate to the users' needs and preferences, and not much is being done to bridge the gap. The systems personnel are not trying to understand the users' needs and the users are not communicating their needs to the staff in information services.

Because the rate of use of a service ultimately justifies continued financing, the sustainability of information projects is strongly linked to their ability to generate products that are suited to the needs and preferences of users — manifested, perhaps, in the users' willingness to pay for the services.

IDRC's response

To help bridge the gap between what is provided by information systems and what is wanted and sought by users, the Information Sciences Division of IDRC will support efforts to design and test methods for surveying users, promotional materials to stimulate demand, surveys of patterns of use and decision-making, and model products and services.

Building national infrastructures

Despite wide variations in human, technical, and financial resources and states of development of the national infrastructures in African countries, certain patterns emerge. These are:

- A lack of awareness among policymakers and managers of the role of information in development;
- The absence of national policies on information;
- The dispersion and lack of coherence of documentary resources;

- Lack of qualified information personnel;
- Insufficient financial resources for information activities; and
- Duplication of services.

National policies on information and informatics

Clear information policies, the integration of information elements in national development perspectives, and definition of institutional responsibilities are required on the part of national governments. External help must be accompanied by a will on the part of governments to create the conditions for development of the information sector and to integrate information into national planning.

The coordination of donors' support is one of the objectives of national information policies, which among other tasks also designate responsibility for the activity and formalize governments' commitment to disseminating information. These are some reasons why African practitioners as well as decision-makers and policy-makers who are aware of information issues are demanding that their governments formulate policies.

First, it has become the practice for governments to allocate resources on the basis of principles and directions laid down by policies. Policies have become, by and large, declarations by governments of intent to take developmental action.

Second, policies establish governance over the national information activity. African practitioners have come to realize that coordination, resource sharing, and information exchange are futile in the absence of regulatory policies.

Third, new dimensions in information delivery have emerged, as the scope and definition of "information" and "information systems" have changed. The change is largely a result of the application of modern technologies, which increase not only the potential but also the demands for statistical, numerical, and specialized information systems.

A national information policy resolves confusion over who is responsible at the national level for taking stock of proliferating developments as well as of any adverse effects. Judging from the experience in women's affairs, population, energy, and environmental issues (which were nebulous as recently as a decade ago), one can say that policies improve the chances for locating accountability and for spearheading change.

Lastly, an information policy can open the way for the emergence of an informatics policy that lays out guidelines for the application of information technologies, computers, and telecommunications to information systems and services. The development and application of informatics in the African context, including manufacturing, depend on political direction, which clearly emerges in:

- Import restrictions as they affect informatics products;
- Priorities in allocation of foreign exchange to acquire informatics products;
- Appropriate and, to the extent possible, locally generated technologies;
- The use of local informatics capacities to assist in resolving problems in priority areas of development such as food and desertification;

- The role of informatics in reducing the dependence of the South on the North;
- Development of human resources for informatics applications, adaptation, and development; and
- The most logical "entry point" for manufacturers of informatics products.

Many governments in Africa already have regulations that affect informatics; the lack of a policy on information means that the regulations are seldom consistent. Without policies, governments cannot hope to stimulate an integrated approach to information or to motivate coordination and cooperation among existing information agencies or effective use of available professional capabilities.

At present, information handling in sub-Saharan Africa is generally not a planned activity, and governments do not have inventories of the facilities available. On the basis of good will, not policies, individuals cooperate with each other, but the structures do not encourage coordination. Library and documentation units have been set up in large numbers in government ministries and departments, and in some cases they compete.

In general, training of information personnel remains traditional, with insufficient emphasis on new technologies, networking, and document analysis for regional information systems. Professionals with adequate training often cannot act because of inadequate financial resources. Equipment is insufficient and the sophisticated machines are broken down because of the lack of spare parts and local know-how to maintain them. Despite rapid expansion of computer setups in Africa, bibliographic applications are relatively isolated and generally do not interest African computer scientists.

The governments have put significant resources into the development of libraries, documentation centres, and statistical offices. Despite this, the existing infrastructure for information is not adequate to provide the input needed for development. The social and economic crises that have beset the region and that have forced governments to shift priorities have consumed resources that might have otherwise gone into information; the level of resources available to information services has generally declined.

External funding from multilateral and bilateral sources has contributed to the creation of information infrastructures. However, governments have been unable, and in some cases unwilling, to absorb recurrent and capital expenditures after the external assistance ends. Time limits on aid projects produce constraints on recipients, especially in countries where budgets do not include allocations for information activities. Often, the result has been the collapse of the capacity the projects helped to build.

Where the capacity has survived, it is often underused, as are the documents, books, journals, and data accumulated. Documentation centres are usually located in capital cities, out of reach of many potential users. Some centres cannot afford to obtain many of the materials they consider essential, but commonly two centres acquire identical materials at considerable cost.

Some centres possess qualified staff as well as the requisite facilities, whereas others have high-level staff without corresponding financial support and equipment that would permit optimal use of the professional capacity. Most centres barely manage with the skills, equipment, and other facilities available to them.

Types of information systems

The information systems installed in countries can be analyzed according to whether the nation has taken a "mission" oriented or "diffusion" oriented approach to development. Countries that have adopted a diffusion approach, such as those in the Association of South East Asian Nations (ASEAN), have put resources into a broad range of disciplines supporting technology education, information services, technical training, standardization and compatibility in mechanization, and multi-disciplinary research. These countries have tended to be successful and have moved in a fairly short time into the category of so-called newly industrialized countries.

In mission-oriented countries, major resources have tended to be allocated to single schemes or programs deemed to be particularly promising (e.g., defence, heavy industry such as aluminum smelters, and hydrocarbons) to achieve a breakthrough in economic growth. Countries such as Brazil, India, and Nigeria have taken this approach and have, on the whole, been less successful than diffusion-oriented ones. Implicit in this observation is that diffusion of information on research and development linked to national priorities is a better focus in the long term than production from a sector or sectors.

To accomplish diffusion, governments need to support an information structure with components at local, district, and national levels, fully supporting scientists, extension workers, technologists, policymakers, and the general public.

The national information centres feed information into, as well as draw information from, district-level services set up to assist in the planning and implementation of development. At present, very little or nothing exists by way of infrastructures for statistical data collection or documentation systems at the district level, but the ability to generate development data and document activities on which to base decisions would be valuable. Some of the functions such a service could provide are:

- To establish and maintain baseline data for socioeconomic indicators as support for a bottom-up approach to rural development planning;
- To find out what information the rural people and extension agencies need;
- To explore alternative modes of information gathering and delivery at the local level;
- To evaluate communications programs and indigenous knowledge networks;
- To repackage information for local audiences;
- To study relationships between information use and decision-making in the rural context;
- To provide backup and coordination for village information services;
- To provide information links to the national rural development agency, the research and development system, and rural development-oriented training institutions; and
- To provide documentation systems services for the agencies operating from district planning centres.

Local government information systems could provide the link for statistical

and nonstatistical information about local (rural) people and their national governments. The local statistical units would take charge of collecting and regularly updating basic statistics (population numbers, crops, land use, industry, prices, meteorological conditions, health, etc.), following standards and tools developed at the national (or international) level.

The use of microcomputers would facilitate storage and updating as well as the transmission of data to the higher levels of government. The quality of statistical data would be improved because the local people (if they wish to do so) could be recruited to validate data.

Whenever feasible, data gathered through normal administrative functions of government should be incorporated. The integration of data files to permit the creation of new information and synthetic data sets can be considered. Data integration between surveys and administrative records can make possible early warning systems (for trade, debt, drought, and famine), ensuring an up-to-date picture. Integration of statistical information systems with other types of information systems can improve the validation of the data and define the context from which the statistics are derived.

At present, in general, the statistical information available in Africa is inadequate, out of date, and inaccurate. Those who use the information make plans and promises that can never be fulfilled. The introduction of local government information systems could improve the accuracy and timeliness of what is collected in future, serving governments, academics, legislative bodies, the mass media, the private sector, extension workers, and the general public.

Although users sometimes need statistical data from sources outside their national boundaries (for comparison purposes and in the case of migrant workers and trade opportunities), they mainly need statistics collected nationally.

Unfortunately, international agencies and donors often satisfy their own needs at the expense of national objectives. Expensive frameworks (e.g., systems of national accounts) are being pushed on governments who do not yet have the infrastructure in place to collect and disseminate basic statistics (Commonwealth Statisticians 1985). The costly collection of national aggregates at the pan-African level mainly serves the needs of users in pan-African and other international agencies; it does little for the national statistical users.

Too much effort has been concentrated on structuring systems and centres rather than on evaluating the relevance of services to the users — from policy-makers to peasant groups.

Administrators need statistical data and information synopses; development workers require extension materials (repackaged) and teaching materials; rural peoples need special products and services, including nonwritten materials, community-run mini- or micro-libraries, and news media; and all the groups need information on development projects.

Within this general outline of infrastructural shortcomings, IDRC and other donor agencies can act to strengthen the structures by establishing criteria to guide decisions on areas of concentration. These could relate to:

- The level of economic development of a nation;

- National development priorities and needs of user groups; and
- Characteristics of information projects.

IDRC's response

IDRC's Information Sciences Division would like to contribute to build local networks for collecting and distributing statistics, strengthen community documentation centres, and set up district-level capabilities. It sees particular merit in pilot services for information gathering and dispersal at the village level. The types of support it can give vary with the infrastructure already in place in the countries.

For countries that have a relatively developed information infrastructure, the Division will give priority to improvement of the mechanisms to coordinate and implement a national information system. Activities it will support include identification of information centres and services; harmonization of methods and procedures; production of national bibliographies, directories of services, etc.; training of high-level personnel; and implementation of computerized documentation. The national centres that participate in PADIS (Pan-African Documentation and Information System) are appropriate to this type of approach.

The Division will assist countries with weak infrastructures to create operational documentation centres in priority sectors (such as agriculture) and to develop human resources. The objectives of projects must be consistent with the areas of greatest need and with the socioeconomic environment. One of the offshoots of IDRC's links with SADCC initiatives is contacts with countries in Portuguese-speaking Africa. The countries in this group have few trained specialists in information handling, so the Division's role is to provide training for personnel and strengthening of documentation services in a few sectors.

One criterion for selection of projects is the inclusion of methods that satisfy the needs of users — and particularly needs of rural populations and of marginal urban groups — and that support sectors such as education, agriculture, and health.

The Division sees merit in community documentation centres, at least on an experimental basis in cooperation with self-help organizations and groups working at the grass-roots level. It encourages projects with long-term goals that fit into a broad national strategy. In all cases, it will seek better integration of existing structures and resource sharing. An example is in assistance to national centres participating in RESADOC (Sahelian Scientific and Technical Information and Documentation Network). Also, it will seek to coordinate its work with other aid agencies and explore joint funding of projects. As members of the Division, we believe representatives of donor agencies should meet periodically to engage in multilateral, formal programing, the aim being to complement activities and improve comprehensiveness.

The Division favours proposals that diversify and promote factual data bases as well as statistical and bibliographic systems. Examples include information systems for early warnings of food shortages, preparations to handle health emergencies, procedures for debt management, control of national accounts, monitors for external trade, and indicators of structural adjustment and reforms in policy.

The Division will help as much as possible to open the way for formal participation in resource sharing by different information services within and between

countries. During the design of projects, institutions expected to be participants and users are the major focus. At IDRC, Information Sciences staff look for activities, tools, and methods that facilitate resource sharing and favour funding projects that contain mechanisms to promote coordination.

In future, the Division will give more emphasis to national-level projects than has been the case in the past. Traditionally, IDRC's Information Sciences Division has favoured the "top-down" approach to development of information infrastructures in sub-Saharan Africa. The idea has been that regional setups can provide the impetus for the development of structures at lower levels. The consensus now is that a more balanced distribution in IDRC's intervention at regional, national, and subnational levels is desirable. This will not compromise the emergence of regional and subregional systems and networks where warranted. In fact, the Division's national-level interventions will, where appropriate, introduce and strengthen links with broader information systems.

Also, without prejudice against new applications, the Division will concentrate assistance on strengthening existing infrastructures and systems. Currently, information systems and services are emerging more rapidly than they can be meaningfully supported by IDRC and its partners who fund information programs.

IDRC is ready to aid in the evolution of policies both on information and on informatics. The form of intervention differs because of the contexts. A national policy on information could and should be formulated by local personnel with advisory assistance (e.g., from PADIS) where appropriate. IDRC's Information Sciences Division plans to help make it possible to implement these policies and to guarantee the availability of the techniques and mechanisms for coordination and resource sharing that should induce governments to consider establishing national policies.

In informatics, the Division can support activities to build know-how and can enhance the capability of institutions to conduct research. In many developed countries, the information sector is recognized as being important for the economy, especially if one includes activities that produce or integrate the technologies, tools, and services to support it (including, for example, computers, software, and data communications). In Africa, this sector is small and often virtually unrecognized, even as a potential vehicle for economic development. The reasons include lack of appropriate policies and shortages of skilled personnel, training and research facilities, telecommunications, industrial infrastructure, and professional bodies. Furthermore, it is unrealistic to expect a major shift in the short term. In Africa, information is not viewed as a commodity of value that must be paid for. This attitude inhibits the financing of the sector both commercially and publicly.

The ability to offer information services and to develop skills in information technology is enhanced by a local capacity to produce, adapt, and maintain the technologies and tools; conversely, any local industry depends on a market and a supply of skilled personnel.

In some of the more technologically advanced African countries, the information sector is being viewed as one client of a potential informatics industry — one involving computer hardware, software, and applications for public and private administration, resource management, planning, and, of course, information. To be successful, the industry will have to be based on regional strategies and cooperation because of the training, capital, and market needed. Also, the emphasis should be

on producing software and other information-intensive activities that are not capital-intensive. The entry point for most effective action at present appears to be applications involving microcomputers.

Within this realm, a research-supporting organization such as IDRC can help:

- Sensitize policymakers to information as a tool for development;
- Promote national policies in information and information technologies;
- Support the development and use of appropriate technologies in information projects in the region;
- Support information services on the relevant technologies to promote awareness of existing gaps and, hence, opportunities for the development of products and services;
- Train local staff; and
- Undertake studies into, for example, the types of software required by disciplines regarded as priorities for development.

Processing, storage, and dissemination of information are long-term activities; they must be woven into a nation's political fabric, perhaps from threads of well-designed projects supported by donors such as IDRC.

Sharing resources across the region

Sharing is part of the solution to the shortage of resources now and in the future. However, it presupposes a network: well-defined institutional arrangements among cooperating information services, tools and methods that facilitate the exchange of resources (e.g., directories, union catalogues, and common methods), and a willingness among the leaders of the participating centres to work together.

Several attempts at coordination and resource sharing have failed because these prerequisites have not been provided for. Unhealthy competition between agents of information delivery (e.g., the university versus the public and national libraries) has disrupted several coordination attempts.

Because of the drain on resources in the acquisition of foreign documents, a priority is national coordinating structures to ensure against duplication in acquisitions, to protect against competition among centres, and to implement national policies on information. The coordinators' role is separate from information handling, which should be decentralized and undertaken in the documentation centres.

Effective coordination is possible only if national information networks or coordinating agencies are set up and are regarded as a prerequisite to participating in regional information systems. In the meantime, regional agencies can work together to harmonize their techniques and procedures (from subject coverage to intersystem compatibility).

Cooperation among regional and national institutions could extend to the use of new technologies and the training of staff and upgrading of their skills. For example, educational institutions — such as the École bibliothécaires, archivistes et documentalistes (EBAD, School of librarians, archivists, and documentalists) in

Senegal — could work with regional centres that have expertise in information handling — such as RESADOC for computerized documentation activities. Training institutions should include courses on information-gathering and repackaging techniques for all professionals — not only those who work in the field of information.

Sharing resources — locally, nationally, regionally, and globally — is essential to the application of information sciences; in fact, when viewed as a resource, information can be regarded as a valuable commodity for South–South cooperation. The benefits are obvious, although they do not flow evenly to all the participants in information systems or even in a manner proportionate to input. Cooperation and coordination are key ingredients — not easy to achieve, particularly when more than one country is involved.

Despite the difficulties, sharing is under way on many fronts in Africa and represents an answer to some of the shortages of personnel, facilities, and funds on the continent. The groupings of countries differ according to the aims of the organizations. For example, international research agencies such as ICRAF, ILCA, and IITA divide programs on the basis of ecologic zones because of the environment's pervasive effects on crops and animals. Some donor agencies, such as the United States Agency for International Development (USAID), have adopted similar groupings.

Other agencies are based on major geographic groupings, and still others focus on official languages as the common element. In southern Africa, SADCC unites countries that have a common political aim — to offset the negative effects of South Africa's political systems. SADCC is a subregional organization with a strong emphasis on sectoral information services. It has greater political will for action than do organizations with other ties. Its member states appear ready to cooperate in developing intersectoral links to reduce their economic and logistic dependence on South Africa and generally to improve their infrastructures and research capabilities.

The rationale behind some groupings of countries is not always apparent to a casual observer. The groupings of countries for the purposes of aid from the World Bank are based on economic indicators, although the main tables do not include data for countries with populations below one million.

- Poorer countries in semi-arid regions — these six countries represent 8% of the total population of the region. Their average per capita GNP in 1982 was USD 218 and, between 1960 and 1982, their average growth annually was –0.1%.
- Other poorer countries — the 17 countries in this group account for 48% of the population. The average GNP in 1982 was USD 254 and the average annual growth rate between 1960 and 1982 was 0.9%.
- Intermediate income petroleum importers — the 11 countries in this group have 15% of the total population. The average GNP was USD 634 and the growth rate the same as that of the second group.
- Intermediate income petroleum exporters — the five countries of this last group total 29% of the population of the region. The average GNP was USD 889 and the growth rate about 3.2%.

The common elements that link the nations into groups that can appropriately share resources bring into sharp focus the tremendous disparities among the countries that constitute sub-Saharan Africa. The differences show up clearly in their infrastructures for information. For example, in West Africa, Senegal has a strong potential impact regionally despite its difficult economic position; it has national policies that promote information sharing and many trained information scientists, documentalists, etc. Likewise, Burkina Faso, Cameroon, Congo, Côte d'Ivoire, Mali, Nigeria, Togo, and Zaire can effect change throughout the region and have strong human resources. In contrast are countries such as Chad, Guinea-Bissau, Mauritania, and Sierra Leone whose economies are in dire straits and, although some have a strong political commitment to information structures, the regional impact of support to them is likely to be minimal.

In East Africa, Botswana, Ethiopia, Kenya, Malawi, Rwanda, Seychelles, Swaziland, and Zimbabwe have indicated a national capacity or willingness to establish information services and policies and priorities for information systems.

Among themselves, the sub-Saharan countries agree that national activities are the building blocks for regional sharing of resources, but the pace toward the creation of regional institutions has been slow and frustrating for many.

Building the regional information infrastructure, as well as the services, products, and other outputs that emanate from it, can be justified on a number of grounds.

First, regional information programs provide opportunities for cost-effective information delivery, and they can optimize the use of scarce resources. In this connection, the PADIS statistical data bank and the methods being developed for its operation are a good example; the tools will be useful and could be replicated at minimal cost in member states. Thus, regional information programs have a cost-effective, catalytic, and multiplier effect in the transfer of know-how, skills, and technologies.

Second, regional information services can play central roles as network intermediaries in the receipt of user requests, providing replies or directing users to appropriate sources. Given the difficulties users in sub-Saharan Africa encounter in accessing information available in the rest of the world and given the fact that computerized data-base hosts supported with remote-access capabilities will take a long time to materialize, it is reasonable to expect that centralized regional networking will be the order of the day for some time to come. In addition, regional centres such as PADIS, RESADOC, and ARCT (African Regional Centre for Technology) are well placed to produce services and products with regional perspectives.

Lastly, regional (multinational) cooperative arrangements (e.g., customs unions, river-basin organizations, and environmental monitoring groups) are bringing to light not only requirements for new types of services but also new dimensions to cooperation in information work where accuracy of data, timeliness in reporting information, as well as the speed of disseminating (transmitting) data and information happen to be of a higher order. Regional information infrastructure building gives renewed importance to specialized tools, methods, and standards.

As an example of emerging cooperative arrangements, the work of the Intergovernmental Authority on Drought and Development (IGADD) is noteworthy. IGADD, with headquarters in Djibouti, represents the interest of six East African

countries in coordinating development policies and mobilizing assistance to alleviate the effects of drought and desertification. It is mission-oriented and works to coordinate aid for three time frames: emergencies, short term, and long term. Its major fields of activity are food security and early warning systems, desertification control, water management, interregional communication, agricultural research and training, and animal resources.

Its current priorities for information systems include:

- Subregional early warning and food-information systems;
- A documentation centre and information data bank on East African agricultural sciences; and
- National drought-monitoring and climatological data centre.

In regional systems, each country takes responsibility for contributing its own documentation. This territorial formula eliminates much duplication, although overlap in the subject scopes of regional information systems at times creates confusion. For example, some national members have been asked by AGRIS (International Information System for the Agricultural Sciences and Technology) and by RESADOC to contribute the same documents and, thus, have requested the systems to define their subject scope clearly and take advantage of each other's holdings by down-loading information. The potential for information exchange extends not only to serving specific subject needs but also to satisfying the needs of countries who have common geopolitical, climatic, and linguistic ties. Several countries are now regularly obtaining bibliographies from PADIS and AGRIS, and RESADOC has set up similar arrangements.

Obviously, the quality of a regional information system is closely linked to that of its country sources. One way in which national information centres can improve their input is to take advantage of contacts with specialized information analysis centres, which have been set up at institutes of excellence such as the international agricultural research centres. Personnel at these centres (or at the request of the centres) review the literature and analyze the findings, discriminating among documents in a way not normally possible with the level of expertise in national information centres.

The specialized information analysis centres can, thus, provide valuable support to the development of national information centres. However, they must adopt the role of providing a service and assistance, not competing with national efforts. They could offer national personnel training opportunities and charge fees to offset a portion of the costs.

In this way, national programs gain strength from regional systems; national flows of information seem to be particularly enhanced when the management of regional centres is decentralized, as is the case with the information systems under the umbrella of SADCC.

Decentralized information handling: the SADCC model

SADCC provides an example of how information systems can be decentralized for regional input in sub-Saharan Africa. It is developing information systems in agriculture, food, industry, energy, and fisheries and is developing a

network to ensure standardization and computer hardware coordination. These systems are evolving in parallel with SADCC itself, which is a decentralized organization of nine southern African countries.

Each country is responsible for coordinating action in a particular sector and acts as host for the coordinating centre. The activities in each sector are decentralized, with each state being relatively free to determine its priorities for programs and content, to negotiate the resources needed for implementation, and to ensure the objectives are met.

Most of the states are concemed with developing capital infrastructures that will form integrated regional systems and facilities or with exploiting natural resources. They are planning or undertaking inventories that will be maintained by the sectoral centres. The data will be available to all SADCC countries and be linked by sectoral networks. Facilities are being established to collect documents and to provide access to collected materials.

The plans for one sector — agriculture and natural resources — include development of a substantial capacity for research. The sector is divided into subsectors, and the responsibility for development is allocated among the member countries. Inventories for the subsectors already exist, but the information is not comprehensive enough to support good research. The libraries are generally inadequate, as are the setups to provide access to primary and secondary literature. As a result, the researchers feel isolated, criticize the information services, see little value in contributing their findings, and abandon what has been a fruitless search for relevant information.

To improve their services, the sectoral centres are attempting to establish links with international data bases. The expansion is desirable from the viewpoint of the users, but because the intemational interconnections are made at the sectoral level rather than at SADCC, the activities jeopardize the compatibility between the systems for different sectors. Also, staff at sectoral centres are committed to collecting and supplying information for all the national members but have less interest in sharing information with other sectoral centres. Nevertheless, the political commitment to share at the SADCC superstructure level can be built upon.

At the sectoral level, the mechanisms for coordinating efforts are too weak at present to ensure continued compatibility among systems, hardware, and software, especially if donors tie their funding to specific equipment or know-how. Without assistance, the information services cannot be sustained.

Concern for these issues has already surfaced at SADCC: two studies were commissioned by the secretariat as a basis for recommendations about computer systems in the region. Neither study, however, fully addresses the question of how to enhance the sharing of information.

Clearly, the information systems in SADCC are a case study on how a decentralized structure works for different sectors and nations in various stages of development.

It is now essential to ensure some coordination of the information systems within SADCC — the parent organization assuming a major role in liaison, collaboration, and influence to ensure that information is shared among sectors as well as nations. The best route to consolidate services appears to be support for standard

methods of exchange, leaving the sectoral centres to determine the content and services.

In human resources development, SADCC could support the training of information brokers who concentrate on breaking down the isolation of researchers and systems and encourage information seeking by users. Because only a part of the information would be shared among sectors and nations, the focus should be to develop protocols for exchange of information.

Standards, common methods, and coordination

Inherent in all cooperative information systems and activities is standardization of methods and content to make efforts compatible and complementary. The participants have to agree on the criteria for selecting data (e.g., data reliability in statistical systems), the means of describing information (e.g., bibliographic formats and standard character sets), the means of classifying information (e.g., indexing systems and thesauri), the media used to store information (e.g., standard microfiche sizes), the tools and technologies used to process information (e.g., common software packages for microcomputers and hardware standards), analytic tools (e.g., socioeconomic indicators), and outputs.

This coordination does not imply complete uniformity in the selection of tools and methods — in addition to being impractical, this can be undesirable. Rather, it implies careful consultation about systems, interfaces, information exchange formats, and overall compatibility at the time that systems are designed. Certainly, cooperative information systems in Africa, such as PADIS and RESADOC, have been fostering a common approach to information problems for some time.

In Africa, language differences are a major obstacle to the full sharing of information. The main official languages are Arabic, English, French, and Portuguese, but these are second languages for many of the people. Although secondary information services in subjects such as agriculture and medicine provide abstracts and indexing of literature published in different languages, unpublished materials and texts from the popular media are usually not treated in this way. Some journals and newsletters publish summaries in languages other than the one in which the document was written, and these approaches are to be encouraged, as is familiarity with several languages on the part of information intermediaries.

At national and local levels, the many languages and dialects create communication problems that may impair the acceptability of information imparted by extension workers. Sociological and cultural differences also create barriers. Information intended for grass-roots users must be available in the local language and must be supported by information intermediaries who have skills in the use of local dialects.

At times, definitions of terms differ by locale, so information services at the national level should develop glossaries that can be used in the production of texts in local languages. Differences in definitions of data are also likely to occur at the regional level so that standard terms, definitions, specifications, and methods must be developed.

Contributions by donors

Standardization, cooperation, and coordination could be encouraged by donor agencies. However, because many donor-supported information activities emerge from requests by country representatives, the impact of these projects on regional cooperation in information sharing is often minimal. Although each government is responsible for coordinating donor activities within its country, donor agencies could aid the process by supporting programs with a component for information sharing. This is one way to strengthen regional institutions and links.

Several donors have set up mechanisms by which they provide information about their activities. For example, IDRC operates the Interagency Development Research Information System (IDRIS) on behalf of the Australian Centre for International Agricultural Research (ACIAR), the US Board on Science and Technology for International Development (BOSTID), the German Appropriate Technology Exchange (GATE), the International Foundation for Science (IFS), the Swedish Agency for Research Cooperation with Developing Countries (SAREC), and IDRC. The system contains information on research projects supported by these agencies, and the Canadian International Development Agency (CIDA), the United Nations University (UNU), and USAID are expected to join the system shortly.

In addition, there are sectoral systems such as the Current Agricultural Research Information System (CARIS), which is operated by FAO for the agricultural sector, as is the initiative by the International Service for National Agricultural Research (ISNAR) to work with directors of international agricultural research centres to collect information on their activities in Africa.

The United Nation's (UN) register of development projects and the World Bank's Special Program for African Agricultural Research (SPAAR) are proposed systems for coordinating information on research activities supported by the UN system and other donors. Such systems contain much information needed by African institutions. If the links were set up, the two-way flow could help eliminate duplication of research. Subsets of stored information could be down-loaded by local or regional groups so that they could be searched by scientists in Africa.

At present, donor agencies act in isolation and could improve the impact of assistance if they had some mechanism to minimize duplication. One positive sign is that increasing numbers of donors are meeting informally to discuss support, but formal links are needed.

IDRC's response

In addition to supporting the development of information standards, common methods, and mechanisms for coordination in Africa, the Information Sciences Division of IDRC will encourage research into new methods and approaches to facilitate information sharing. For sub-Saharan Africa, with major information needs and limited resources, cooperation in this field is essential.

IDRC has been supportive of, and at times instrumental in, the emergence of regional information programs (PADIS, RESADOC, etc.) that have now started giving results. IDRC can justifiably shift its assistance from the institutional core to specific projects and networking. Assistance will continue because the agenda of

work has barely been concluded: the regional programs will be progressing and, therefore, encountering new challenges.

It will also view favourably proposals from several regional organizations that have plans to implement specialized information services — some conventional (bibliographies), others original by sub-Saharan standards. Most of the latter amount to experiments — customs clearing house at ECOWAS, the trade information system of the Preferential Trade Area (PTA) for eastern and southern African States, early warning systems at IGADD, desertification monitoring at SADCC, etc.

By supporting regional information sharing, IDRC is well placed to promote links and cooperation between existing and emerging information systems. Common methods, regular exchange of information data bases, sharing of expertise and capacities (training, equipment, and technologies) should not be left to the discretion of individual proposals; rather, they should be conditions that recipients undertake to fulfill.

Because of the opportunities that regional and subregional organizations present for multiplier effects, the Information Sciences Division will continue to work closely with them. At the same time, it recognizes that the member countries have their own priorities; they must be treated individually because benefits from such groupings do not flow equally to all members. All groupings, based on common elements among the countries, nonetheless incorporate very different lands and peoples.

The Division will consider increased support for decentralized regional and subregional systems and will help ensure that regional systems benefit national users. For example, it expects to assist SADCC to coordinate development of its information systems and to standardize exchange methods. It also will consider SADCC's preference for 10-year funding to enable proper and self-sustaining development.

It will encourage rationalization of responsibility for organizing the literature among existing systems.

It will urge specialized information analysis centres to cooperate with each other and with national research programs and perhaps to install outreach information services run by local personnel to benefit national research efforts. Outreach services could handle many of the current requests from local centres that need help in software, management of seed and gene banks, organization of field-trial results and socioeconomic indicators, bibliographic records management, etc.

The Division's strategy in considering national projects is to concentrate on countries ready to cooperate with each other; it is also to expand on information services of countries taking the lead in a discipline for which an information system is being proposed. Because of limited resources, the Division must favour projects that build on what is available in the states rather than funding new systems.

The Division is currently exploring ways in which it can provide assistance to research in and on South Africa and to southern African groups located in countries bordering South Africa.

Other measures of support will be aimed at strengthening networks in sharing of resources, for example:

- Assessing the impact of PADIS to determine desirable directions for development;
- Improving the compatibility between information systems and methods at national and regional levels;
- Introducing referral services (rather than duplicating existing specialized services);
- Enabling strong groups in the region to undertake special consultative and trouble-shooting missions;
- Fostering South–South cooperation (e.g., between groups in sub-Saharan and North Africa) by, among others, strengthening formal mechanisms and umbrella organizations that exist to institutionalize such cooperation — such as OAU, the Nonaligned Movement (NAM), and the League of Arab States (LAS); and
- Looking favourably at case studies and experimentation with the twinning of selected African institutions such as the École des sciences de l'information (ESI, School of information sciences) with EBAD, among national documentation centres, and among AGRIS centres.

Upgrading skills of information personnel

One sphere in which regional information systems and specialized information analysis centres can have a major effect is in upgrading the skills of information personnel. The scope for training and instructional support is wide, because all of sub-Saharan Africa is characterized by:

- Poor human resource utilization — information specialists are not considered part of the "development community," and the profession is accorded low status, with the result being poor use of available personnel;
- Lack of appropriate teaching materials — education programs cannot respond to changing needs, and the professionals are not kept abreast of recent advances in the use of computers;
- Lack of information on information tools, technologies, and methods; and
- Lack of tracking materials and the absence of policies to regulate and promote the elaboration of such materials.

The role attributed to information workers by the user community and the one they identify with is custodians and preservers of information. This attitude limits the use of the information available and eliminates the potential action by information personnel as development workers. To overcome this requires marketing and promotion of services, increased public relations, and increased remuneration for information practitioners. Whether more effective communications can lead to better remuneration or, conversely, improved salaries can motivate such activities is uncertain; however, the injection of opportunities for improved training and education is clearly a first step.

The upgrading of the skills of professionals teaching and practicing information sciences could be accomplished through short courses, exchanges of faculty,

joint research, and various programs. The foci for continuing education include management techniques, computer applications, research methods, production and use of teaching materials, marketing, financial management, and systems analysis and design. Information personnel need to understand how their skills can benefit business, public administration, agricultural extension workers, etc. They also require technical knowledge of library documentation and information sciences.

The availability of computer systems to support information services requires more technical proficiency in the analysis and design of applications for information processing that will be useful to administrative and managerial functions in modern organizations. On this issue, the consensus is that universities should recognize the needs and develop appropriate curricula.

A consolidated plan of action would include four elements:

- Advanced training programs;
- Training programs for paraprofessionals as well as those already in service;
- Training in information technologies, tools, and methods; and
- Appropriate training materials.

Advanced training programs

The objective of advanced training programs is to create a nucleus of technically qualified people for a broad multiplier effect. This includes both the training of information professionals to conduct research and teach at postgraduate levels and the training of people for library and information system management and information careers other than traditional librarianship. Advanced training improves management of organizations and institutions as well as broadening the employment opportunities of the trainees.

Activities to achieve the objectives are:

- Optimizing the use of national and subregional institutions by upgrading the expertise of information personnel (providing fellowships for training trainers, establishing faculty and student exchange programs, study tours, and designing and promoting internship schemes and research projects);
- Designing curricula responsive to the environment to be served; and
- Providing a part-time continuing route to higher educational status.

Establishing criteria to attract strong candidates and setting up occupational classifications with commensurate salaries should be considered in parallel with the training possibilities.

Training for paraprofessionals and for those in service

The training of paraprofessionals should be at specialized institutions geared to the demands of the tasks expected. In contrast, the training for information personnel who have extensive experience should be to upgrade their technical quality and managerial skills. Individuals who are at high levels may have little academic background but have developed expertise on the job.

Seminars, workshops, and short courses can be offered to these personnel — for example, to introduce them to ideas about serving rural populations, managing services and staff, solving problems, etc.

A new emphasis is needed in the training of information specialists so that they can effectively disseminate relevant information at the grass roots and can help village-level intermediaries obtain relevant information. These are not easy tasks for several reasons: there are too few intermediaries and extension offices to serve the communities and current opportunities for training are not geared to their needs. Attention needs to be given to methods of recruiting paraprofessionals and developing curricula for intermediaries at the village level.

Training on information technologies, tools, and methods

Almost all information professionals in Africa need training on how to use the technologies, tools, and methods that they use in their jobs. Information workers should have access to courses (including continuing education) and to relevant information services for their field because new information technologies are emerging and the existing ones are changing rapidly.

The curriculum needs to be tailored to the level, needs, and probable working environment of the individual. Not all African information workers need to learn how to use microcomputers, but some general introductory material to computer literacy (even without "hands-on" training) could be of value in the future. For advanced-level information professionals (e.g., at the postgraduate level), training in the conception, design, and use of systems involving a variety of information technologies is important. The key element is to teach enough so that information professionals can make informed choices or can effectively use technical expertise in these areas.

In addition, there is the issue of providing technical training to produce the ensemble of technical skills needed to support the information technologies themselves so that one can build up local information and information-technology industries and infrastructure. A regional, cooperative approach is needed here.

The work of PADIS and RESADOC in developing, testing, and replicating tools and methods for processing development literature has been rewarding. Efforts to develop competent personnel in sub-Saharan Africa on the use of MINISIS (Interactive Minicomputer System for Information Retrieval and Library Management) and computerized documentation techniques have started paying off as PADIS has been able to provide training and to serve as a site for attachment training sponsored by other agencies — the experience of ALDOC (Arab League Documentation Centre) in the Arab world has been similar. Thus, regional information programs have a cost-effective, catalytic role in multiplying the know-how, skills, and technologies needed by information workers.

Information professionals need enough knowledge to communicate effectively with those involved with the supporting technologies, for example, documentalists, computer systems analysts, and computer programmers. Similarly, computer professionals need to be exposed to information applications — including, for example, documentary data bases, text-based systems, and statistical data banks.

Appropriate training materials

If adequate training is to be provided, the trainers must have suitable teaching materials. The objective is to find ways of providing materials that relate to the professional problems and experience of the trainees as well as to the environment in which they work.

IDRC's response

Within this plan of action, IDRC's Information Sciences Division will contribute to the training of advanced personnel by establishing relevant programs and offering fellowships and seminars where possible.

It will continue to support regional efforts to upgrade and develop computer applications and to share know-how and skills through seminars and innovative methods. Similarly, it will work to strengthen the education, research, and practice of library and information science and to establish and harmonize professional norms, standards, and methods.

It will also encourage African consultants and educators to produce materials that ensure full application of the concept of information sciences at postgraduate as well as other levels. Likewise, it will support curriculum development and training related to information tools and technologies.

The Information Sciences Division will work with other divisions within IDRC to promote multidisciplinary investigations of the impact of information tools and technologies.

It will support services, newsletters, and networks that contribute to the sharing of information about information tools, technologies, and methods. These activities will be closely linked with training information personnel — both initial and continuing education.

It will also encourage and support activities involving experimenting on, adapting, and using information tools and technologies, particularly in disseminating information. The Division recognizes that experience with information tools is a prerequisite to creating local expertise. Experience is gained either through experimentation or through regular use within an information system or service. Even when experimentation is the object of the exercise, however, the tests should be fashioned to serve real applications, with feedback and evaluation from users.

One specific service the Division can offer is the software MINISIS for managing and exchanging information and the know-how to make use of it. Training for computer technicians to use and apply MINISIS has been offered for some time now. Several organizations in developing countries now participate in conducting the 3-week introductory course as well as the 2-week advanced course. They also provide technical advice and maintain specialized components of the MINISIS software.

IDRC's Computer Systems group will enhance the dissemination, support, and development of MINISIS through the establishment of MINISIS resource centres. For Africa, this will mean some strengthening of institutions in conjunction with transfer of technical skills to enable organizations to meet the criteria. Once established, the resource centres can conduct training for new and experienced

users of MINISIS and provide them with technical assistance in developing applications.

Funding and sustaining services and systems

For the purposes of funding, projects can be divided into four phases: preliminary, project development, implementation, and donor disengagement.

During the preliminary phase, donor agencies and developing country organizations form a commitment. For information projects, this phase includes, for example, a review of national information policies; end-use analysis; design of a strategy to provide information to the sectors of national priority; a careful look at the institutional, financial, and human resources available and required for the start-up phase; and an attempt to isolate major weaknesses. Although national governments themselves must ensure the projects contribute to their overall goals in information and development, the donor is obliged to clarify the long-term consequences in funding — i.e., that donor support is temporary — perhaps encouraging pilot or preliminary projects that clarify needs.

In the project development phase, the framework and managerial procedures are designed, consistent with local conditions. This phase is a customizing period, linking goals and objectives with a realistic plan of work. It includes confirmation and commitment by all participating institutions, detailed assessment of needs and constraints, preparation of operational procedures, introductory workshops for decision-makers and users, and training for project staff.

The focus of the implementation phase is on finding practical applications, operating efficiently, and tailoring outputs. This phase is funded principally by governments, with some input by donors. Monitoring and evaluation are crucial.

In the donor disengagement phase, the donor provides some financial backup to cover foreign-exchange crises but transfers to local authorities any project responsibility remaining in its hands. The aim is to ensure that all components are operating efficiently at the lowest cost possible. This phase involves mechanisms designed to assist sustainability, including fees and other means of self-financing, accountability, and performance evaluations.

Given that information services are open-ended, the design and implementation of information projects cannot be tied to a schedule from inception to completion. The question of how long an information centre should be funded by a donor or government is difficult to answer.

The design of projects must include mechanisms to reevaluate the facilities and services and to update them in line with national priorities; both the products and the tools must change accordingly to reach users and contribute to national development. An information service that has outlived its usefulness should be terminated, but new development-oriented services have an expected lifetime longer than 10 years. Unfortunately, grants of only 2–3 years tend to be offered, and longer-term financial commitments are rare. African practitioners have found the donors' approach to be a serious impediment to progress and sustainability of information systems, because planning becomes piecemeal, staff of the right calibre are difficult to attract, and some activities never get off the ground.

Under such circumstances, it is easy to find successful information services in Africa that are in jeopardy. Donors must be aware of the problem and be more favourably disposed to long-term funding. The common practice of setting up teams and then depriving them of adequate time and support to consolidate and adapt their services is irresponsible. It has led some organizations, such as SADCC, to stipulate 10 years as the norm for external funding of development projects.

Financing and evaluating information services

Various sources for financing have to be envisaged for information services, including, as suggested by African practitioners, trials with fees for service and membership where appropriate. Recovery of all costs for all services, or even some costs for some services, is unrealistic, and some form of subsidy must be expected. A large proportion of information services, including public and academic libraries and statistical offices support the public good. Worldwide, such services rely to a large extent on the national treasury, although they generate some income.

Users in Africa have been willing to pay for information where services provide what they need. In fact, the revenues can be a measure of the value or success of certain services and permit the information managers to evaluate their system's response to users, as well as satisfying donors and government administrators.

Other methods of evaluating performance and the usefulness of objectives include keeping and regularly reviewing records of the services. Useful data to collect include numbers of requests filled, documents distributed, categories of users, days spent on particular activities, revenues, and parameter changes. By keeping track of such activities, one can quantify, for example, the cash outlay for each user and each item of information. Like revenues from users, such information is a tool for management and helps donors and governments plan long-term support.

IDRC's response

IDRC is unique among donor organizations in having brought support for information services under the management of one division. This has enabled a coherent approach to be developed. IDRC, like other donors, however, tends to view its supporting role as limited to providing seed money for a set duration.

The grant period worked out with the recipient institution is supposed to give the recipient time to plan to incorporate the information activity into its core budget. The underlying assumption is that start-up costs are necessarily higher than operational costs. In theory, this is a sound basis for action, but in practice it rarely works.

Managers of research institutions have competing demands for their funds, and, unfortunately, few are able to discern the underlying value of information programs when faced with setting priorities to meet the demands for hard-core research. It is extremely difficult to demonstrate a monetary value for information. Even the most successful information centres experience budget problems because funding is not available within their institutions. Thus, the issue becomes whether to provide core institutional support where information is to be part of the plan of action and not merely, as is often the case, a special project or appendage that the donor finances.

The Division recognizes that some countries have greater difficulty than others in providing counterpart contributions. Other problem areas include maintenance of materials purchased with project funds, capabilities in project administration, and integrating project staff into the institution's payroll. Finally, financial assistance should be viewed as a long-term endeavour, preferably with regular evaluation to correct problems and build upon improvements.

Given this reality, the Information Sciences Division will be more favourably disposed to institutional funding than it has been in the past and will view 10 years as the norm for external funding of new services.

Over the long term, recipients must assume financial responsibilities, perhaps covering part of the costs through a user-pay system. This type of system encourages responsible use and can be treated as collective ownership even if the contributions do not cover all costs.

The key phrase is financial stability. To help projects achieve stability, the Division will explore methods such as endowments, multiagency approaches, and private–public enterprise systems.

Endowment funding provides stability, but donors such as IDRC have not favoured it because the initial outlay is substantial. It can cover operating costs — something donors do not normally like to fund because careful monitoring is needed to avoid misuse.

Collecting funds from a group of donors is an attractive alternative because the benefits from cooperation among donors are not limited to the increases in financial support. A disadvantage, however, is the loss of contact between donor and recipient. IDRC has fostered close relationships with its contacts and will probably have some difficulty adjusting to the distancing that is inherent in arrangements with multiple donors.

The Division agrees to support African practitioners in their efforts to improve revenues from information services through advertising and perhaps joint ventures with private industry — for example, in disseminating information on fertilizer and trade. These are ways in which the services can justify continued and increased financing by the national purse as governments move to accept responsibility for creating and maintaining information services. IDRC support is to complement government outlays and will be contingent upon commitments by governments.

Nevertheless, the message that must be conveyed to donors is that information activities are an aid activity and should be as much a priority as, for example, research projects. Although IDRC's Information Sciences Division can promote partial cost-recovery ventures and encourage self-sufficiency, it must be prepared to support information activities over a longer period than at present, given the poor state of information infrastructures in Africa and the equally poor record of governments in finding the money to sustain them.

Putting the Strategy to Work: Recommendations for Program Delivery

The Information Sciences Division must face some operational issues when implementing the Africa strategy. The method employed to establish the comprehensive set of objectives and tasks for the Division was based on a coordinated, divisional approach that seems equally appropriate for the implementation phase. The framework is now in place for an integrated geographical program. Its impact can be reinforced by the plan designed for implementation. Without a coordinated effort, some of the connections and some of the momentum could be lost.

Coordination

The Division must set up a mechanism for coordination to ensure that its program proceeds purposefully toward the declared objectives. To be effective, the mechanism must be designed to direct human and fiscal resources to avoid duplication of effort, encourage sharing of experience among program staff, and facilitate intersectoral activities. It must be efficient, and it must not introduce additional bureaucratic controls within the Division.

The design for the coordination mechanism depends on the number and qualifications of Divisional staff based in Africa and the level of authority delegated to them. This report contains recommendations that would change the staffing pattern for Africa over the next few years. Staff in the Information Sciences Division believe that the rationale for changes is clear and note that delegation of authority to program officers and regional directors has also been increased recently by IDRC's Board of Governors.

The plan to coordinate and implement the Africa strategy, therefore, must be flexible enough to accommodate this increased responsibility, and therefore accountability, in the regional offices. For practical purposes, the recommendations contained in this report envisage a phased approach that evolves, as resources and authority levels permit, toward African-based control of the program. This would enable Divisional staff to respond positively to recommendation 7.5 of the Winegard Parliamentary Committee that, in IDRC, "substantial decision-making authority be transferred from headquarters to its well-established system of field offices" (Winegard 1987).

Regardless of specific changes, the Africa strategy presumes interaction between Ottawa and the three regional offices serving Africa. The Division will set up regular communications between a group of associate directors based in Ottawa

and the program staff based in Africa. The two groups will use telecommunications technologies where appropriate and feasible.

The Ottawa team will have a core comprising the associate directors of the Computer Systems Group, the Information Tools and Methods section, the Socio-economic Information section, and the Science and Technology Information section, plus the Deputy Director. The team will call upon other Ottawa-based staff as required. Its main functions will be to maintain an overview of the priorities and parameters of the program in Africa, to review the global contributions of the Divisional program (including interregional issues), and to recommend to the Director Division-wide allocations of resources.

The Africa-based team will consist of all the Division's program staff in the three regional offices. Its main functions will be to identify, develop, and monitor projects; evaluate programs and policies; and provide input to sectoral and divisional plans for the program of work and budget. The tasks will include sharing program information, managing the pipeline for research proposals, and planning tactics to realize the objectives outlined in the Africa strategy. These activities demand good communication among the three regional offices.

Together, the two teams will be responsible for monitoring progress in implementing the Division's program in Africa. They will assume a more active role in sectoral strategic planning; contribute to overall strategic planning that is expected to be done in the regional offices; identify opportunities for collaboration with other donors and regional or subregional institutions; document and report on activities to inform and guide the Division's program staff; develop mechanisms for updating the objectives in relation to changes in the region; monitor the project pipeline for compliance with the objectives of the strategy; act as catalyst for interregional discussions; initiate periodic reviews of the project pipeline and its budgetary implications; and convene meetings to strengthen the coordination.

These mechanisms for coordination must have a favourable effect on delivery of the Division's program without adding to the bureaucracy.

Project development and approval

Linked to coordination is project development, the responsibility for which is also expected to move increasingly to the regional offices. Even initially, regional program staff will have increased accountability, developing preliminary proposals for an associate director to give quick review and approval for inclusion in the pipeline. The regional program officer would then proceed to develop the project proposal in final form and submit it to the associate director.

The Division will consider the viability of allocating resources for projects to each regional program officer in a way that gives more flexibility than does the present system, which is tied rigidly to the status of the pipeline at the start of the fiscal year: any such allocation will be given within Centre policies and guidelines.

Meanwhile, within present limits, steps can be taken to increase the ability of the Division's staff in Africa to respond promptly to local events and needs. Regional program officers located in Africa will be allocated increased funds for which they have signing authority beginning in fiscal year 1988/89. Authority for

project administration will also be decentralized to the Divisional program staff in the three regional offices serving Africa. A status consistent with a high-level of decentralization was obtained for the Division in the Regional Office for Eastern and Southern Africa on 1 September 1987, and efforts are under way to secure similar status for the other two offices.

Most of the operational issues mentioned so far have been for the Division's program staff located in Africa. Most program staff, however, are based in Ottawa, and they, too, will participate actively in putting the Africa strategy to work. They will retain their sectoral specializations, which are global, and will be responsible for strategic planning and evaluation of projects in their sector. Consulting with regional program staff, they will develop sectoral plans that are consistent with the objectives of the Africa strategy. They will also be involved in project identification, development, and monitoring and will be active on the ground in Africa as well as in the other regions.

The idea is to maximize the contribution of specialist staff in implementing the Africa program while maintaining their global responsibilities. Interaction with the regional program staff is expected to evolve from an administrative exchange to a substantive discussion of sectoral and geographical opportunities.

Geographical budget allocations

IDRC is a responsive organization in that it responds to individual proposals submitted to it rather than going out and initiating project requests. However, this responsive stance does not eliminate the need for planning. For example, IDRC plans the sectors in which it is prepared to be responsive: it recruits staff competent in selected fields and allocates funds available in those fields. The concept of using sectoral allocations to improve program management is well accepted. What is proposed here is the logical next step: introduction of geographical allocations.

The limited geographical allocation that takes place at present is based on the distribution of projects in the pipeline, i.e., it is essentially an after-the-fact allocation. Shifts in geographical expenditures in the Division usually happen by chance rather than by plan. Examination of the regional distribution of appropriations in recent years confirms the volatility. To overcome fluctuations, to protect the availability of resources for Africa, and to improve planning and management of the Africa program, the Division should allocate to Africa a specific percentage of its program funds.

Of the least developed countries, 70% are located in Africa. Although the numbers of people in the countries are relatively small, the problems are major and the infrastructures weak. The percentage of appropriations that the Information Sciences Division invested in Africa through IDRC's three regional offices has fluctuated over the last 3 fiscal years between 30 and 50%. The recommendation is to stabilize the allocation, identifying in advance a realistic figure for appropriations to Africa beginning with fiscal year 1988/89. For planning purposes, the target figure would be 50% of the total program budget for information sciences. Achieving such a target could be accomplished through careful management of the project pipeline and through tentative allocations to the three regional offices. These allocations would constitute the funding envelope for the Division in Africa, representing

the total appropriations to be made in Africa for computer systems, information tools and methods, socioeconomic information, and science and technology information. It does not automatically mean that each sector must dedicate 50% of its resources to Africa; the actual distribution between sectors would be a topic for review by the two coordinating teams from their global and local perspectives.

Growth of financial resources

Experience has demonstrated the vast numbers of opportunities for the Division to support projects outside Africa. Project development in Africa appears to be more time-consuming and less predictable than equivalent work in Latin America or Asia. Introduction of a notional allocation of funds for Africa would ensure adequate resources are protected for use in Africa. However, to maintain present levels of program activity in Latin America and Asia and permit expansion of the Africa program, the Division will seek an increase in its core program budget.

Staffing requirements

To strengthen implementation of the Africa strategy, the staff based in Africa will need to be increased. The additional program staff would have responsibilities in subject areas of priority to Africa. These specialist staff would not be confined to their particular region but would operate across the continent. This mixture of specialists and generalists would increase the Division's ability to respond in selected fields and permit the Division to accommodate increased project activity.

Additional person-years were requested to fill these new positions. These sectoral specialists would be located in the regional offices in Dakar and Nairobi.

This approach would be part of a coordinated Divisional plan for staffing of regional offices. In addition to promoting an organized succession of staffing within the regional offices, the plan would provide staff with an excellent opportunity for professional development.

Whether additional person-years become available or transfers are made from Ottawa, the plan has implications for the Division's operational budget beginning in fiscal year 1988/89.

The initial fields of specialization for the new positions in Africa would be informatics, trade and industry, and health and environment. Consideration was given to a specialist in agriculture, but this topic is already receiving attention throughout the continent. Also, communications within information systems and services in Africa clearly need strengthening. Additional attention must be given to ways of conveying relevant information more effectively to primary audiences, including, for example, populations in rural communities. The Information Sciences Division, therefore, intends to work closely with the Communication and Social Sciences divisions to explore ways of applying available IDRC expertise in this field.

The place of MINISIS must not be overlooked in the effort to provide support for informatics. Interaction between Divisional staff from the regular and the MINISIS programs will be encouraged. Within limits, the MINISIS outreach

officer would be a source of specialized advice to the program staff across the continent and would be encouraged to participate in project development related to the MINISIS program.

Human resources development

The need to strengthen human resources in Africa in the information field was stressed by Africans participating in the Division's review. It has, thus, become one of the principal objectives of the strategy. Given the importance of the subject, the possibility of placing an educator in the region was considered. However, all program staff of the Information Sciences Division must be aware of opportunities to develop human resources, and the current thinking in the Division is that an appropriate approach would be to work with the Fellowships and Awards Division to develop a joint strategy addressing different types of training.

Project modalities

Several issues raised during the workshops — such as strengthening existing systems, increasing the training opportunities, providing long-term financial support, and increasing the information flows at the community level — will require that the Division undertake studies to decide an effective operational approach. Many of the studies will be Division-wide and will be coordinated by the two teams. For example, the Division will examine how best to achieve its objective of promoting South–South cooperation in Africa. This could involve surveys of the expertise available in selected fields, workshops for project leaders, troubleshooting trips by local consultants, and other techniques — the initial activity will be an exploration of the potential for promoting access by sub-Saharan Africa to the expertise already residing in North Africa. To have an effect, the Division must pursue these operational approaches in a logical and integrated way.

In addition to carrying out such analyses, the Division will draw on the accumulated experience within IDRC. The result should be an expansion of the traditional approach to projects, including institutional support, program support, multiphased project support, use of network advisers, and small-grants projects. By approaching the work in a coordinated way, staff of the Division believe that benefits will accrue to the whole program. The coordinating teams will be responsible for keeping track of the activities, but all staff within the Division are expected to contribute to identification and application.

Program plans

Each of the three program sections plus the Computer Systems group will outline a plan of action describing activities to be undertaken in Africa by its program in accordance with the principal objectives. This will include, for example, workshops intended to identify projects, seminars to strengthen sectoral information systems and services, utilization and evaluation studies, and other special measures being taken to enhance implementation of the Africa strategy.

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II — Acronyms / Sigles

ACDI	Agence canadienne de développement international
ACIAR	Australian Centre for International Agricultural Research Centre australien de recherche agricole internationale
AGRIS	International Information System for the Agricultural Sciences and Technology Système international d'information pour les sciences et la technologie agricole
AIDS	Acquired immune deficiency syndrome
ALDOC	Arab League Documentation Centre
ANASE	Association des nations de l'Asie du Sud-Est
APPER	African Priority Program for Economic Recovery
ARCT	African Regional Centre for Technology
ASEAN	Association of South East Asian Nations
BOSTID	Board on Science and Technology for International Development
BTC	Botswana Technology Centre
CARIS	Current Agricultural Research Information System Système d'information sur les recherches agronomiques en cours
CASTAFRICA	Conference on the Application of Science and Technology to the Development of Africa Conférence sur l'application de la science et de la technique au développement de l'Afrique
CD-ROM	Compact-disk read-only memory
CEA	Commission économique pour l'Afrique
CEAO	Communauté économique de l'Afrique de l'Ouest
CIDA	Canadian International Development Agency
CIPEA	Centre international pour l'élevage en Afrique

CODESRIA	Conseil pour le développement de la recherche économique et sociale en Afrique Council for the Development of Economic and Social Research in Africa
CRAT	Centre régional africain de technologie African regional centre for technology
CRES	Centre régional d'énergie solaire Regional centre for solar energy
CRDI	Centre de recherches pour le développement international
DEVSIS	Development Sciences Information System Système d'information sur les sciences du développement
EBAD	École de bibliothécaires, archivistes et documentalistes School of librarians, archivists, and documentalists
ECA	Economic Commission for Africa
ECOWAS	Economic Community of West African States
ESI	École des sciences de l'information School of information sciences
FAO	Food and Agriculture Organization of the United Nations Organisation des Nations Unies pour l'alimentation et l'agriculture
FIS	Fondation internationale pour la science
GATE	German Appropriate Technology Exchange Centre allemand d'inter-technologie appropriée (Deutsche Gesellschaft fuer Technische Zusammenarbeit — GTZ)
GDP	Gross domestic product
GNP	Gross national product
ICIPE	International Centre of Insect Physiology and Ecology Centre international sur la physiologie et l'écologie des insectes
ICRAF	International Council for Research in Agroforestry Conseil international pour la recherche en agroforesterie
IDRC	International Development Research Centre
IDRIS	Interagency Development Research Information System Systèmes inter-agences d'information sur la recherche en matière de développement
IFS	International Foundation for Science
IGADD	Intergovernmental Authority on Drought and Development Autorité intergouvernementale pour la sécheresse et le développement
IIAT	Institut international d'agriculture tropicale

IITA	International Institute of Tropical Agriculture
ILCA	International Livestock Centre for Africa
ILRAD	International Laboratory for Research on Animal Diseases
ISNAR	International Service for National Agricultural Research Service international pour la recherche agricole nationale
LAS	League of Arab States
LEA	Ligue des États arabes
LIRMA	Laboratoire international de recherche sur les maladies des animaux
MINISIS	Interactive Minicomputer System for Information Retrieval and Library Management Système bidirectionnel de miniordinateur pour le repérage de l'information et la gestion de bibliothèque
MNA	Mouvement des pays non alignés
NAM	Nonaligned Movement
NGO	Nongovernmental organizations
OAU	Organization of African Unity
ONG	Organisations non gouvernementales
ONU	Organisation des Nations Unies
OUA	Organisation de l'unité africaine
PADIS	Pan-African Documentation and Information System
PAPRE	Programme africain de priorités de reprise économique
PIB	Produit intérieur brut
PNB	Produit national brut
PTA	Preferrential Trade Area for eastern and southern African States
RESADOC	Réseau sahélien d'information et de documentation scientifiques et techniques Sahelian Scientific and Technical Information and Documentation Network
SACCAR	Southern African Centre for Cooperation in Agricultural Research
SADCC	Southern African Development Coordination Conference Conférence de coordination pour le développement de l'Afrique australe
SAREC	Swedish Agency for Research Cooperation with Developing Countries Agence suédoise de coopération en recherche avec les pays en développement

SIDA	Syndrome d'immuno déficience acquise
SPAAR	Special Program for African Agricultural Research Programme spécial pour la recherche agronomique en Afrique
UN	United Nations
Unesco	United Nations Educational, Scientific and Cultural Organisation Organisation des Nations Unies pour l'éducation, la science et la culture
UNU	United Nations University Université des Nations Unies
USAID	United States Agency for International Development Agence pour le développement international des États-Unis
ZEP	Zone d'échanges préférentielles pour l'Afrique orientale et australe

III — Papers resulting from the meetings / Communications découlant des réunions

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